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The latest common standard specifications of the Harriman Lines for 90-lb. Bessemer and open-hearth steel rails are printed in another column. These lines are buying only 90-lb. rails this year for main line service, and it is thought that the plan adopted, as embodied in these specifications, will give better rails for the main line than these companies have been getting heretofore. The plan advised by the American Railway Association of marking the rails A, B, C, D, etc., according to their position in the ingot, starting from the top, has been adopted in these specifications. By excluding the top, or A, rails from main line use, the effect of an additional 30 per cent. discard is obtained, and at the same time the discard is saved for use on sidings and other locations where second-hand rails usually are used. The roads are thus doing their own discarding beyond the manufacturers' allowance, and saving the product without risk to the quality of the main-track rails. The most radical deviation of these specifications from the previous common standard specifications is in the chemical composition, where higher carbon is required, the figure corresponding to the American Society of Civil Engineers' and the Maintenance of Way Association's specifications, which are higher than the American Railway Association's and the Manufacturers'. The open-hearth figure corresponds to the specifications of the several technical associations, which are approximately the same, and are higher than the Manufacturers'. In the open-hearth specifications it will be observed that the drop-test clause provides that *two* test pieces shall meet the requirements. This is because of the greater tonnage of metal in an open-hearth heat as compared to a Bessemer heat, there being about five times as much metal.

In the broader aspects of railway finance the existing tendency to resort to bonds rather than to stocks is somewhat strikingly shown by the listings on the New York Stock Exchange during the first six months of 1909. Including street railway companies, which in financing are now adopting much the same policy as the steam lines, the bond listings of the exchange have been approximately $365,000,000 for the six months and of stock listings $254,000,000. The listing, of course, does not necessarily or actually mean new financing and in many cases refers to old issues, notably of bonds. But it registers a tendency and expresses a condition natural in a period following a year of acute business depression. In the aftermath of the anxieties of such a year it is the bond —the senior security—rather than the stock, the junior security, which catches the conservative investor's eye and the railway must conform to the market's mental condition, which has also been indexed by the enormous sales of railway bonds since the first of the year. The look into the future raises a number of queries: How much longer is the "bond period" to last? What ultimate effect on stock values and dividends will the increase of bonds and fixed charges have, taking the railway systems of the country as a whole? And to what an extent have the new conditions modified the views of a considerable group of railway presidents who a few years ago favored, whenever possible, the conversion of bonds into stock and of the contingent dividend for the imperative fixed charge?

RAILWAY DISCRIMINATION.

In a recent address before the Traffic Club of Philadelphia, F. A. Delano alluded to the very different attitudes of public opinion and public authorities toward discrimination when practised by railways and when practised by other business concerns. The Interstate Commerce law recognizes that certain forms of discrimination by railways between shippers and localities are fair and necessary to commercial well-being and progress. A railway may not charge one shipper more than another for the same service; but it may charge one 75 cents for hauling 100 lbs. of silk 1,000 miles and another only 25 cents for hauling wood plow-handles the same distance over the same line, although the difference between the costs of the two services be negligible. It may charge a higher rate for a shorter than for a longer haul when the circumstances of the two hauls are substantially dissimilar—when, for example, water competition is met at one point and not at another. The law and the courts see that to treat shippers or communities similarly where conditions are dissimilar may be as unfair as to treat shippers or communities dissimilarly where conditions are similar. But many writers and shippers do not take this intelligent view. The roads constantly are denounced for discrimination such as the law permits. Law-makers, shippers and even some economists, condemn forms of discrimination by railways which are upheld when practised by other concerns.

One might think, from the way the virtuous traffic managers of some industrial concerns and commercial organizations talk that the practice of rebating had been banned by law and condemned, by morals since the camels of the wise men of the east were the principal common carriers, and that iniquitous railway traffic managers were solely respon-

sible for its existence and long continuance. The statement of a few facts about the past history of rebating may throw some light on the motives of the shippers in some communities who at present are crying aloud about alleged unfair discrimination of other kinds. One important point to be recalled and borne in mind is that before the passage of the original Interstate Commerce Act the railways had as much legal right to discriminate in rates between their patrons as manufacturers or merchants had to discriminate in prices between their customers. Under the common law if a common carrier made a reasonable rate to one shipper, it could make as much lower rate as it pleased to a competing shipper. To condemn a railway for having given cut rates or rebates to a favored customer before the passage of the Interstate Commerce Act is therefore on a parity with condemning a manufacturer or a jobber now for following the general custom of giving cut prices and rebates to large customers.

Before the passage of this law the roads saw that from their standpoint rebating was a bad thing, and sought by forming pools and other devices to suppress it. Did the now virtuous shipper help them? On the contrary, he got the pooling section of the Interstate Commerce Act passed, which was instrumental in causing a revival of rebating. After this the roads sought to suppress the practice by forming strong traffic associations. Did the shippers now co-operate with them? No, they got the federal department of justice to bring suits under the Sherman law that broke up the traffic associations, and rebating speedily became as prevalent as ever. Once more the roads tried to stop it by entering into various "community of interest" arrangements. And once more the department of justice, at the instigation of shippers, took action adapted to revive rebating. Suits were brought or threatened to break up the alleged combinations. It was only after federal law made it as penal to *receive* a rebate as it had before made to *give* one that most shippers began clearly to perceive the true iniquity of the practice.

The federal government as well as shippers was in a large measure responsible for the long continued violations of the Interstate Commerce Act. While the department of justice prosecuted the roads under the Sherman law for forming combinations which were mainly intended to stop rebating, the department and the Interstate Commerce Commission did little to enforce the Interstate Commerce Act. The commission spent most of its time and energies in lamenting the general disregard of the latter law and to asking for more power for itself when it might have been collecting evidence and starting prosecutions against the comparatively few railway traffic men who by wilful law-breaking made a larger number, for competitive reasons, of unwilling law-breakers.

What is the economic and moral difference between discrimination in its various forms when practised by railways and when practised by manufacturers or jobbers? If a manufacturer sells equal quantities of goods to two merchants and accepts $100 less from one than from the other, is the one benefited or the other injured any less than if a railway charged the one $100 more than it charged the other for the transportation of the goods? Or is there something about the till of a railway that taints rebates that pass through it while the rebates that pass through the till of a manufacturer or jobber continue "pure and unspotted from the world"? The railway being engaged in a public service, it is legally bound to treat its patrons equally. But the economic effects of discrimination in the manufacturing and mercantile businesses are precisely the same as are those of discrimination by railways, and it is just as immoral for a manufacturer or merchant unfairly to discriminate between his patrons as it is for a railway. And yet all over the country are manufacturers and merchants who every day practise deceit and discrimination on their customers, and at the same time hotly denounce the similar deceit and discrimination formerly practised by railways.

Much of the current criticism of railways for present discriminations between localities comes as ill from shippers as does a great deal of the denunciation visited upon them for past discriminations. Railways must discriminate in fixing rates on different commodities and in fixing rates on the same commodities to different communities. Commerce could not otherwise be carried on. The only requirement in this regard imposed on them by law or morals is that they shall not discriminate unfairly. As there is no sure criterion as to what is fair and what not shippers are disposed to assume that any discrimination that helps them is fair and that any that hurts them is unfair; and similarly traffic managers are disposed to assume that anything that hurts the roads is unfair and anything that benefits them is fair. But at least the railway traffic manager is in a better position to decide what is equitable as between rival communities than is an organization of shippers in one of the contending communities. It is to the interest of each community to get an advantage over rival communities; and when the shippers of a locality complain that they are placed by a rate adjustment at an unfair advantage investigation may show that the real ground of their complaint is that they are not being given an unfair advantage.

It is to the interest of the railway, on the other hand, to build up all communities along its line. It is not concerned as to the sources of its traffic and earnings, but merely that they shall be as large as possible. Secret railway discrimination has been abolished. Most complaints in future will be against alleged unfair discrimination between localities. The public will reach much more just conclusions about these complaints if it will always bear in mind that in the past shippers have been and that in the future they will continue to be prompted at least as often by selfish and immoral motives as railway men, and that the defenses of railways made by railway officers are entitled to at least as much attention and consideration as are the charges made against them by shippers.

COMPETITION AND CO-OPERATION BETWEEN RAIL AND WATER LINES.

Part First of the Report of the Commissioner of Corporations on Transportation by Water in the United States is at hand, covering general conditions. The volume contains over 600 pages, and yet almost its entire value is contained within the 55 pages devoted to a tabulation of the names, localities, navigable lengths and traffic statistics of American rivers. The report, as a whole, is entirely inconclusive, and it is hard to avoid feeling that the author scarcely knew what he was driving at, although much painstaking work has been done in assembling the mass of not very important detailed information comprising the bulk of the report. It may be presumed that Part II., when it appears, will contain some comment on the material thus laboriously gathered, yet the material at hand is not very suggestive.

Yet the effect of water-borne commerce on the railways of the country is immense. To summarize in words the condition portrayed on the map of water routes accompanying the commissioner's report, through rail traffic in all the states reached by the Mississippi river and its principal tributaries south of St. Louis is profoundly influenced by water competition; so is through traffic in coal and certain other commodies in the states served by the Ohio river, and so is local traffic in many localities, such as New York state, affected by the Hudson river; Virginia and Maryland, by the Potomac, James, Rappahannock, etc.; North Carolina, by the Roanoke and other rivers, and South Carolina, Georgia, Florida and Alabama by the important streams penetrating well into the interior, although forming no connecting transportation system. The same thing holds true in East Texas, in Central California

and in the territory served by the Columbia and the Willamette rivers.

According to the commissioner's report, the Ohio is the most important commercial stream in the country, flowing, as it does, through a prosperous argricultural and industrial region where there is a great tonnage of coal and iron to be moved. Between Cairo, Ill., and Pittsburgh, Pa., the traffic movement on the Ohio river amounted to 13,163,656 tons in 1905, comparing very closely through a series of years with the tonnage movement on the Wabash Railroad.

The Mississippi river has a traffic movement which sounds small compared with that of the Ohio. Between Vicksburg and New Orleans in 1905 the total tonnage was 2,462,974; between Vicksburg and Memphis, 1,855,830 tons; between Memphis and Cairo, 2,238,363; between Cairo and St. Louis only 417,021 tons. About half of this tonnage on all these sections of the river is made up of coal and coke; the other principal commodities are iron and steel, grain, lumber, groceries, provisions and cotton. The traffic between St. Louis and St. Paul is heavier than traffic on the southern part of the river, amounting to some four million tons of freight a year; just about the same as the freight movement on the Wisconsin Central Railway.

As examples of the busy local river may be taken the St. Johns, in Florida, moving some million and a half tons per year, and the Kennebec in Maine, moving about 400,000 tons. The Bangor & Aroostook Railroad moved just about three times as many tons in 1905 as were floated up and down the Kennebec; the St. Johns river, however, does almost twice as much freight business as its neighbor, the Georgia Southern & Florida Railway.

As regards canal traffic, the commissioner's report shows that about 2,444 miles of canals, costing some eighty-one million dollars, have been abandoned within the United States. Pennsylvania, Virginia and New York have been the largest contributors to this specially expensive kind of patriotism, which is still much in evidence in the New York barge canal. The commissioner points out as the primary cause of canal failure the inability of shallow towpath canals to adopt their physical conditions to the demand of modern transportation, and he observes that almost all the canals now in successful use are ship canals forming comparatively short links between important natural waterways and opening up extended routes of transportation by water for large vessels. Such short-link ship canals are to be clearly distinguished from long inland canals.

The commissioner's report on the subject of canal traffic is less illuminating, however, than the special reports on transportation by water, collected in 1906 by Director North. This earlier volume shows how traffic on the Erie canal and its branches dwindled from 4,608,651 tons in 1880, to 3,673,554 tons in 1889, and 2,385,491 tons in 1906, while the canal system of Pennsylvania experienced declines in traffic even more severe.

But on the short St. Marys Falls canal, connecting Lake Superior with Lake Huron, and handling vessels of the largest size in use on the lakes, the net tonnage in 1906 was 41,098,324, more than three times the net tonnage carried by the Suez canal in the same year, although the Suez canal is open for the entire year; while the St. Marys Falls canal is open for traffic for only about eight months.

The great importance of the water-borne traffic on the ocean and gulf coasts receives comparatively small attention in the commissioner's report. Owing to the immense number of small barges employed on the Mississippi river and tributaries, the total tonnage engaged in this traffic is just about equal to the combined tonnage of all vessels engaged on the Atlantic and gulf coasts and rivers, the Great Lakes and the Pacific coasts and rivers. Yet this slow-moving barge traffic has an influence on the general transportation scheme of the country, which is comparatively small compared with that of the steamships on the ocean and gulf coasts, which get a great many more ton miles out of their gross tons than the Mississippi barges do. The total freight handled at the Atlantic and gulf ports (sea-borne) in 1906, including harbor traffic, was estimated by the Census Bureau reporter at 140,512,043 tons, as compared with 52,712,124 tons in 1889. This is just about three times as great a tonnage as the 3,784-mile New York Central system carried in 1906.

The coastwise steamers stopped carrying the mail at the time when the rail lines in the South adopted a track gage uniform with the lines in the North, and coupled up the missing links in a through transportation system—just about 25 years ago. They experienced a good many dull years after their early glories departed, but they are now recognized as of the highest importance in the through transportation system of the country, and they have undergone rapid development in the last five years. The American-Hawaiian line, in connection with the Tehuantepec Railway, is competing actively with the transcontinental rail lines, and now carries some 200,000 tons of freight a year to the Pacific coast cities. The steamers obtain eastbound cargoes, sometimes of salmon, canned fruits and other Pacific coast crops, when these are moving; sometimes of Hawaiian sugar, and they make westbound deliveries of freight on the coast in about four weeks, as against about three weeks for slow freight on the transcontinental railways. The American-Hawaiian company can cut under the through rail rates and still make a profit.

The Southern Pacific lines have now a splendidly equipped water transportation system between New York and New Orleans and Gavelston; a steamship system which did a gross business of more than six and a half million dollars in 1908, despite the prevailing depression. By the acquisition of the Georgia Central, the Harriman lines obtained another fleet of excellent steamships, operating between Savannah and New York, while the railways serving the south Atlantic coast states share with some of the coal roads the ownership of the Old Dominion Line of Steamers between Norfolk and New York.

A few ready conclusions can be drawn from these facts at hand. It seems quite clear that money spent by state and government on long and laborious systems of canals and canalized rivers is going to be shamefully wasted in the future, just as it has been shamefully wasted in the past, although the canal work of former years served a temporary need, which bears no parallel to-day. It seems also certain that the natural deep watergays are going to have a great and continuing development, and that most of this development will be supplementary to, rather than competitive with, the great railway organization of the country.

A PARALLEL AND A CONTRAST.

As railway history goes on with its swift pace, when the things of yesterday are well nigh forgotten to-day, a clear memory is needed to recall the stress and strain through which the American railway passed during a five-year period of the middle eighties. It had many and striking parallels to that other period of depression from which our railways now seem to be emerging. Then as now there was a period of acute legislative pressure. The Federal Supreme Court had upheld the rate-making power of the state within the state. The Interstate Commerce Commission had been organized under law to regulate on the broader plane interstate traffic and had entered on the sphere of activity which has since made that body so big an object in the economic angle of vision. Then as recently and even now in some states the railways were under popular criticism with here and there deep views of demagogism. And there was then, as during the two or three years that preceded our panic of 1907, a time of acute railway speculation, though "high finance" on a great scale was to wait for yet another decade for its fullest development and

later recession. It was naturally, also, among railway magnates, especially of the trunk lines East and West, a period of profound discouragement. Such was some of the parallels between the period of the middle eighties and the depression which now, let us hope, is drawing to its end. There are also some suggestive contrasts. At that time there was railway war and profuse rate cutting. From 1883 to 1888 the freight rate per ton-mile fell from 1,224 cents to 0.977 cents and the passenger rate per mile from 2.422 cents to 2.246 cents. During the past two or three years with the railways working in essential harmony under the pressure of hard times there has been no real war of rates, with the present tendency upward rather than down. Where there has been decline of rates it has been forced by legislation or by the rulings of state commissions not by railway rivalries; and such reductions have in not a few cases been checked by appeal to the courts and will be in more cases. Another striking difference in favor of the later period has been on the fiscal side, the aggregation of what may be called "fluent" capital which has facilitated railway financing and that, too, in spite of the call upon that capital of big new industrial organizations. On the same side there has been for the later period the closer organization and resulting economics of railway service, a result compelled by higher costs of labor and materials as compared with the middle eighties. Finally by way of contrast of the two periods and partly on the negative, partly on the positive side, are the new and costly problems which the railways are fronting in connection, for example, with the terminals in great cities and the new adaptations of electricity.

The emergence from the gloom period of the eighties was due chiefly to physical causes. It was found that lower rates for traffic could be met and offset by efficiencies expended by improved road bed, heavier trains, stronger bridges and, in general, a much decreased unit cost of operation. This physical change has already gone far, is still continuing and its scope and limits in the future are, perhaps, the most vital element in the railway situation. It is unfortunately the element to which the public, as represented by its law-making bodies and its railway commissions, as yet has failed to respond. Every railway improvement sooner or later, and usually sooner, divides its vantages between the carrying corporation and the freight or passenger it carries; and the ability to make that improvement rests on the fiscal credit which during the eventful year 1908 federal and state authority did their worst to impair. By way of contrast again, even the middle eighties made no such exhibit of railway baiting in generality and detail as 1908 when it reached an epidemic stage.

But the financial contrast is far brighter. Recovery from the depression of the middle eighties was comparatively slow; from that of 1907-8 it has been rapid. Wall Street's estimate of railway values is not always conclusive and has its speculative ingredient; but applied to a considerable reach of time it affords a fair index of railway recuperation. Figures recently compiled by the Wall Street *Journal* show an appreciation in the total stocks of 30 prominent railway companies of $2,171,611,172 from their lowest of 1907. The impressive figures will bear some additional analysis. They do not include appreciation of the shares of other railways, of railway bonds, of the shares of leased lines and of collateral properties owned or controlled, but not railways. These included would add probably several hundred millions more to the appreciation. If we estimate the increment of value very conservatively at $2,500,000,000 the appreciation is represented at about 14.5 per cent. based on the $17,234,886,215 of stock and bonds of American railways at the close of 1908. It would be nearly 33 per cent. based on the $7,641,913,086 of capital stock alone and about 18 per cent. based on the $13,902,227,797 returned for cost of roads and equipment. Such an increase as an isolated fact is remarkable as a test of railway recovery and, in a remote sense, of railway stability. Taken comparatively and bracketed with the recovery of values of non-railway securities during a period of depression when cost of labor, materials and commodities in general have not appreciably receded the anomaly against the normal law of recession in panic periods becomes one over which the economists must labor long.

NEW PUBLICATIONS.

Die Anstrengung der Dampflocomotiven. Strahl, Eisenbahnbauinspector in Berlin. Wiesbaden. C. W. Kreidel's Verlag. 1909. 80 pp.

In this monograph the author, after citing the various formulas used to express the relations of the important elements of the locomotive and pointing out how they fail to meet actual conditions, proposes to base the proportioning of these elements on the cylinder power required and on the rate of combustion per unit of grate surface.

The rapidity of the combustion of coal on the grate of a locomotive is automatically regulated by the variation in the steam consumption of the engine. With an increase of steam consumption a larger quantity passes through the exhaust jet, an equivalent larger quantity of air is drawn through the fuel on the grate and the fuel is burned more rapidly. The limit of the rapidity of combustion and of steaming is the physical action of the exhaust jet on the fire. When this action is too energetic holes are torn into the fuel on the grate, unconsumed coal is drawn along and deposited in the tubes, and thus the steaming capacity decreases.

Experience has shown that if with the aid of an exhaust jet the same quantity of air per unit of time be drawn through a given grate burning lump coals of different heat values, approximately the same quantity of water will be converted into steam in every case. The records of German lump coals show that burned on a locomotive grate they will produce 3,500 kilograms of steam per hour and per square meter of grate surface, the boiler working close to limit of its steaming capacity, this value being subject to some variation dependent on the character of the exhaust. There is therefore a direct relation between the power developed by a locomotiv and the coal burned on a unit area of grate. This relation varies with different types of locomotives, and if determined will furnish the means of basing the proportioning of the elements of the locomotive—grate, boiler and cylinder dimensions and revolutions of drivers—on the coal consumed per unit of grate area.

Taking the published records of service runs by locomotives of different types, the author establishes these factors for the maximum continuous work near the limit of steaming capacity of these locomotives.

He gives the following as the necessary data for designing a locomotive:

1. The highest speed to be developed.
2. The most frequent speed.
3. The kind of cars to be hauled.
4. The greatest number of cars in a train.
5. The weight of the train.
6. The grades that are to be passed over hauling a given train (4) without reduction of speed (2).

If the train has to pass over a short steeper grade occasionally, the speed for this is not to be prescribed.

In conclusion the method of calculation is illustrated in detail by two examples: 1. A four-cylinder express locomotive using superheated steam is to be designed for a maximum speed of 120 km. (74 miles) per hour. The kind of cars and also their weight (480 tons) are given. The train is to be taken over grades of 0.2 per cent. at 100 km. (62 miles) per hour. The steaming capacity of the boiler is to be completely utilized, cylinder cutoffs to be economical. 2. Retaining the other dimensions as determined in 1, the dimensions of the cylinders are to be reduced so that the locomotive can be used for hauling a train of a given number of cars weighing 360 tons over grades of 0.2 per cent. with the same economy, i.e., the same consumption of steam per h.p. per hour as in 1.

For the very interesting analysis of the various factors

entering into this problem reference must be made to the original. E. F. E.

The Adventures of a Civil Engineer. Fifty Years in Five Continents. By C. O. Burge, M. Inst. C. E. 320 pages, 5½ in. x 8½ in. Price, 7s. 6d. Published by Alston Rivers, Ltd., Brooke street, London.

Mr. Burge's life has been that of the typical British engineer who finds more work abroad than at home. It is typical, too, in that his basis for engineering work was not gained in an engineering school, but as a student apprentice. He was articled to G. W. Hemans, a son of the poetess, and his early work was in Ireland, where his sense of humor was sharpened and he made a beginning in railway construction. This was more than half a century ago, and the young engineer was deeply interested in the railway near Dublin, where the trains were moved in one direction by gravity and in the other direction by being attached to a piston in a tube laid between the rails. The air was pumped out so as to make a partial vacuum and suck the piston along and move the train. By a lucky chance he became resident engineer on construction of the Madras Railway in India. Always a student, his book shows a thorough practical knowledge of conditions in India and throughout Asia. On his first visit home he got an engagement on the wonderful Festiniog 2-ft. gage railway in Wales. Wandering from there, he was employed on the construction of narrow-gage railways in South Africa, where he spent five years. For a few years he was editor of Colburn's *United Service Magazine* in London. His subsequent engineering experiences were building railways in Spain and Australia. He was resident engineer of the Hawkesbury bridge, built by the predecessors of the American Bridge Company, during the entire period of its construction.

Mr. Burge makes no attempt to give the details of his professional work. It is rather what the title of the book indicates—his adventures and observations generally, on life in five continents.

Letters to the Editor.

THE OPERATING OFFICER AND THE BANKER.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

In your excellent editorials of June 11, 18 and 25 concerning the relations between the labor organizations, the railways and the public can be discerned a new and refreshing disposition to call a spade a spade, and it is to be hoped that you will continue to handle the subject in the same fearless manner, regardless of whose head may be bumped during the process of treatment. This subject has been handled in the past by the majority of writers in rather a weak-kneed fashion and it is a relief to hear the irregularities of dishonest conductors called by their proper name—stealing—and anarchy and general lawlessness given their proper definition.

Your articles, however, seem to imply that the remedy lies with the operating officers, and in this I think you are in error, to a great extent at least. It is true that many officers are the victims of a "feeling of helplessness that a little sand would remove"; it is true that many an operating officer could keep the labor organizations on the defensive, instead of being driven into a corner by the organizations and kept there, but it should be remembered that officers are influenced by self-interest, in that they have their own welfare and future to consider.

There is a conviction among railway men that the officer who is responsible for, or who is prominently involved in, a conflict with labor must inevitably walk the plank soon after the smoke of conflict clears away, and the history of labor troubles in the United States indicates that the conviction is substantially correct. It would not be difficult to find innumerable cases of men who have been quietly dropped from the service of railways because they could not "get along with" labor organizations.

It is not necessary to go into the history of the relations between the railways and the labor organizations, which were originally formed for the purpose of protecting their numbers from the favoritism and injustice shown by pinhead officers; and they were necessary. Influenced by their success in accomplishing the purpose for which they were formed, the organizations have gone much further than was originally intended, and the railways have allowed them to do so. We have, by working the "promotion from the ranks" fad, succeeded in thoroughly unionizing our executive shop forces; a large proportion of our foremen are friendly to, in sympathy with, or afraid of, the shop unions. In our relations with the road organizations we have shown equal brilliancy in legislation; we have legislated in favor of the brotherhoods as a body, and, after exhausting the possibilities in this direction, have legislated for the individual member of the brotherhood, until by the various amendments, supplements, conflicting clauses, amplifications, ramifications and side issues of the "seniority rule" we have made it impossible for officers to keep away from constant friction with the organizations, the men have all there is to be got and there is little left for the company except the privilege of paying the bills. I do not wish to be understood as being opposed to the seniority rule in its simplicity—I believe it to be necessary to protect the rank and file of road forces.

In the long process of arriving at the present status, managers and operating officers have not been influenced by incompetence, insanity or preference; they have been influenced by Wall Street—by the financial interests behind the operating organizations. It is right and proper that the men furnishing the money should decide, but in allowing the situation to develop to its present condition they have developed a tough proposition for the operating officer.

Strikes cost money and disturb financial conditions. There have been innumerable instances where operating officers have been obliged to sacrifice self-respect and submit to intolerable demands of organized labor because the principal interests involved have made it known that they "could not afford trouble just at this time." There is no fault to be found with this proposition; the operating officer who would consider his own feelings or preferences before the financial necessities of the company would be unworthy, but the responsibility for the present condition of affairs should be placed where it belongs.

That the railways cannot deal summarily with the conductor who is detected in stealing seems to be "tommy-rot." That the operating officers cannot handle the railway business on strict business lines generally, seems equally absurd; it will be done when the financial interests become convinced that it is necessary.

The following conclusions seem inevitable:

(1) The labor situation is bad and is not improving.

(2) There will be no material change until the men behind the money decide that a business administration is of more importance than "peace at any price."

(3) This decision will not be made so long as the condition of the stock market is the primary consideration to the men behind the money.

(4) When, by the working of social, financial or economic conditions a business administration becomes of primary, and speculative considerations of secondary, importance, a change will come, and it will not be difficult to develop a body of officers competent and willing to handle the problem.

Summarizing, I would say that in the present labor situation the railways—the financial interests—have got what they want or they wouldn't have it; and as a man's first duty is to his employer it is simply up to us as operating officers to do our duty loyally, as best we know how, under existing conditions.

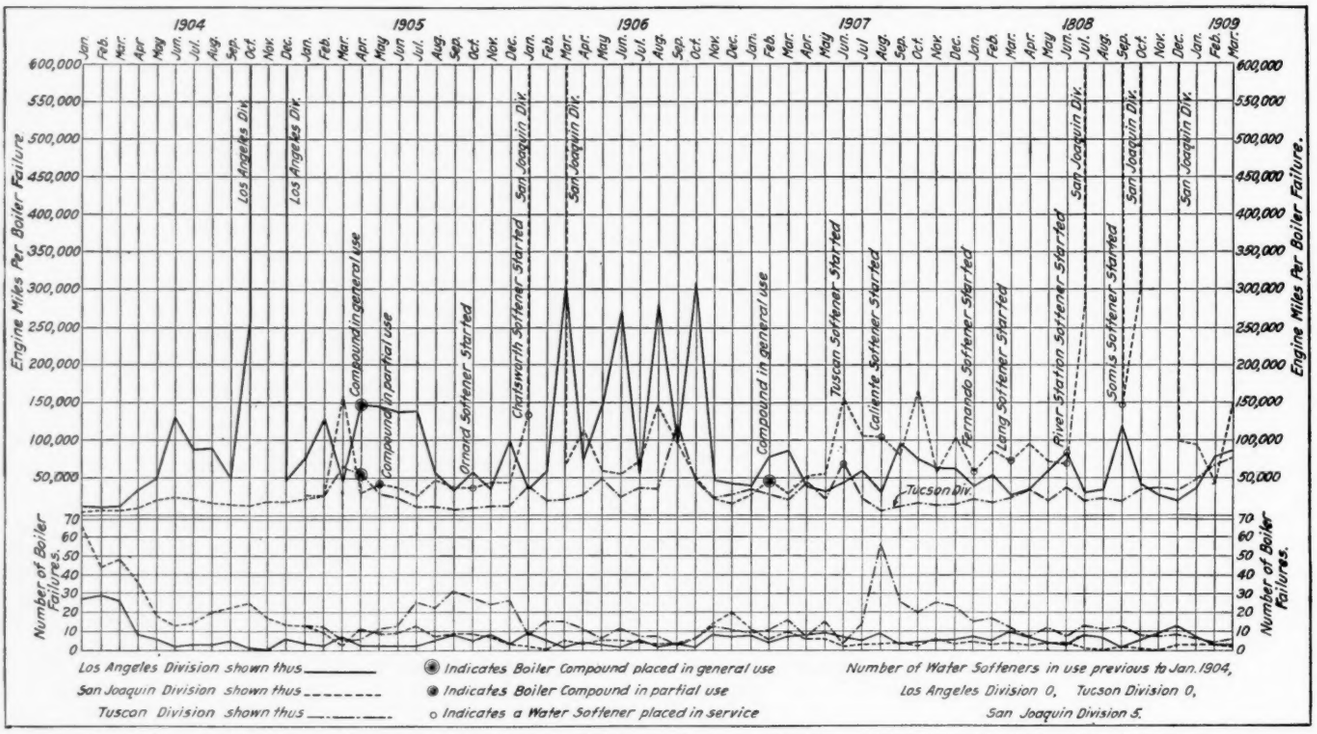
MASTER MECHANIC.

WATER TREATMENT ON THE SOUTHERN PACIFIC.

San Francisco, June 21, 1909.

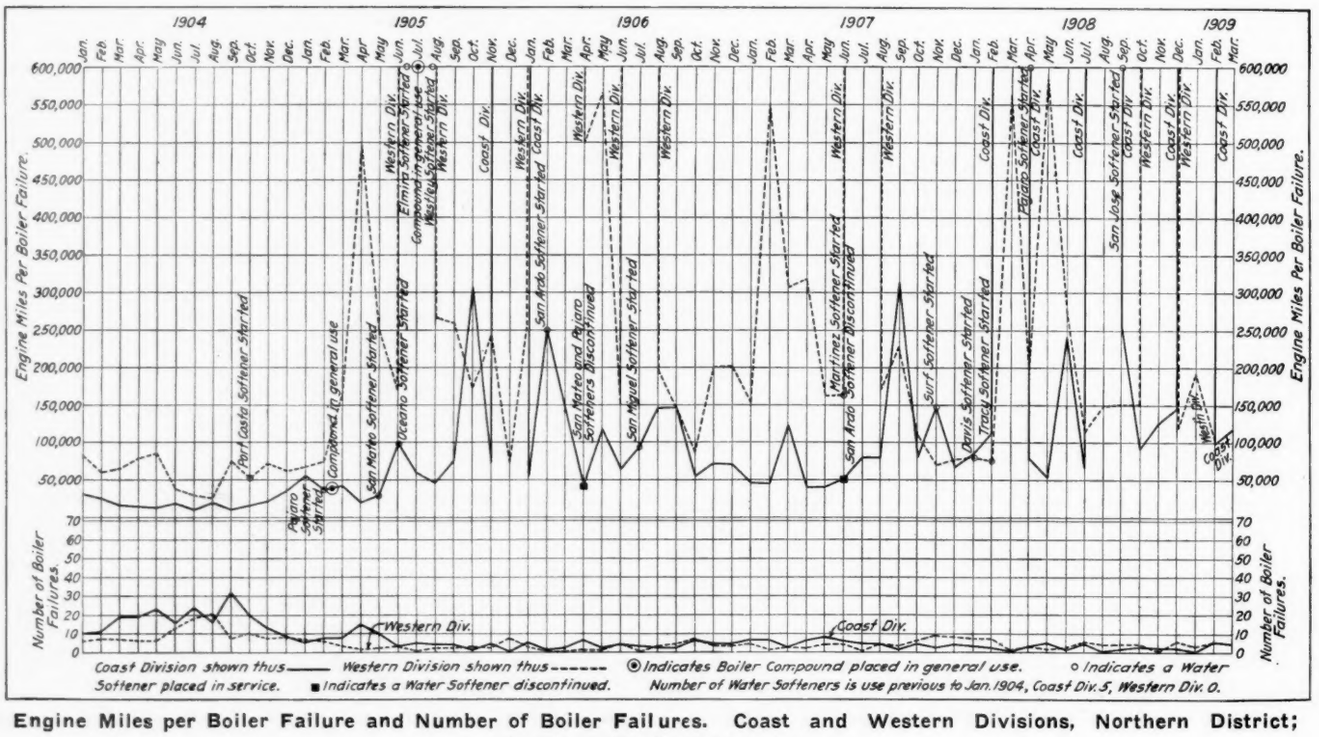
To the Editor of the Railroad Age Gazette:

I noticed in your issue of January 22, 1909, a graphic diagram showing results of treatment of locomotive boiler feed waters. Owing to bad waters at many points on this system we, too, are required to resort to water treatment, and as a matter of interest I have had our records gone over carefully and some data prepared on the same lines as those furnished by the Soo line. This is covered in blue prints herewith submitted and takes in all divisions of our northern and southern districts where water treating plants have been established and boiler compound used. The period covered is from January, 1904, to March, 1909, as indicated, the coordination of lines for the different divisions being based on number of engine failures attributable to locomotive boilers only and total engine miles for each division.



Engine Miles per Boiler Failure and Number of Boiler Failures. Southern District; Southern Pacific Company.

On the prints are indicated the data on which water treating plants were established during the interval or the com-



Engine Miles per Boiler Failure and Number of Boiler Failures. Coast and Western Divisions, Northern District; Southern Pacific Company.

pound used. Periods shown were intended to date from use of the compound and one year previous. This is for all divisions but the Tucson, the number of boiler failures not being available prior to January, 1905. At that time the compound was in use at Gila bend and was in general use the following April. The lines of such a chart, as herewith presented, cannot indicate absolutely positive results, inasmuch as periods of depression in business are not indicated, which have greatly to do with boiler failures in road service. Shortage of power in rush times also influences results. Then again the tonnage hauled or amount of work done by engines would likewise have some effect, and possibly other factors which might be taken into consideration.

In the records shown the matter of water treatment and use of boiler compound necessarily combine. The general trend of the lines is toward improvement, especially in the lower portion, which shows the total number of boiler failures that occurred each month.

H. J. SMALL.
General Superintendent Motive Power, Southern Pacific Co.

THE TRAIN AUDITOR.

Chicago, Ill., July 26, 1909.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

If by your recent articles, "The Train Auditor" in No. 24, and "Peculations of Conductors" in No. 26, executive officers are brought to a more general realization of not only the direct loss but the demoralizing influence on the morale of the service resulting from the irregularities in question, corrective measures will be sought and eventually inaugurated. The spectacle afforded to young men in line for promotion to passenger conductor, by conductors old in the service, whose shortcomings with respect to handling cash are a matter of common talk but who nevertheless seem to be on the best of terms with their supervising officers, is not one conducive to honesty in the future passenger conductor. In addition, the persistency with which the money shortcomings of conductors are often overlooked has an insidious influence on the men who collect for excess baggage, freight and tickets, or who, out on the line, handle any branch of railway detail that affords a possibility of graft or rake-off. Honesty is largely a matter of training and environment, and it is for this reason, as well as that they can be discharged on well grounded suspicion, that train auditors, selected from outside of railway pursuits, have proved advantageous.

Under the present organization of a passenger train crew, train auditors can be regarded only as a temporary expedient resorted to by the accounting department of certain roads to secure a more full return of the revenue. From the foot of the ladder in freight train service to passenger conductor, under ironclad seniority rules of promotion, provides material and gives a schooling which makes the passenger conductor, when he "arrives," an uncertain quantity as to fitness and honesty. It is doubtful whether the requirements of passenger train service demand such a system or whether the present organization of passenger train crews is not obsolete. The days of hand-brake and link coupler trains are gone, and may it not be possible that the passenger train crew organization of those days should be gone also? An organization with the engineer, in addition to his duties at the throttle, as the responsible operating head, back of the engine a man (call him train auditor, cashier or whatever you please) educated and selected for the specific duty of handling the revenue and the passengers, a guard (in operating matters ranking next below the engineer), a flagman and a porter when needed, would seem more suitable to present day conditions. If railway managers have lost control of the promotions to passenger conductor—a fact many schedule agreements show—and the promotions result in placing men unfit for the duties the position involves, the position should cease to exist. A reorganization of the passenger train crew on the lines suggested should prove to the advantage of both economy and efficiency. Deference to established custom may for a time prevent such a change, but progress usually involves a change.

Dealing with the present instead of the future, superintendents should most forcibly impress upon trainmasters and conductors that the collection of revenue is not a matter secondary in importance to getting trains over the road—in other words, that the object of railroading is revenue and not moving equipment from one point to another. Legislation should be sought under which the passenger who, by the connivance or neglect of a conductor, steals transportation could be punished as readily as any other kind of thief. Rules concerning transportation and revenue should be made only with due regard to ultimate consequences, enforced at all times as a matter of justice and discipline, and rules not necessary or inconsequential abolished. Conductors, as well as other employees, discovered stealing should be prosecuted and convicted if possible. Competent evidence in such cases is not always as difficult to obtain as is often represented. If the work of revenue service inspectors were made a branch of the law department, especially so long as trainmasters and higher operating officials are often ex-conductors or relatives of conductors, who from a mistaken sense of loyalty to old associations are disposed to look upon taking a few fares as a fault that may be forgiven in an otherwise good trainman (regarding it as an evil that can be regulated, not stopped) results of a most salutary influence on the morale of the service would follow. Conducted with a scrupulous regard for fairness, such methods would, I believe, be welcomed by the majority of conductors whose uprightness and loyalty is unquestioned.

GENERAL AUDITOR.

Contributed Papers.

SPECIFICATIONS FOR 90-LB. BESSEMER AND OPEN HEARTH STEEL RAILS FOR THE HARRIMAN LINES.

Below are the specifications to which the Harriman Lines are ordering their 1909 rails. The Bessemer steel specifications are given in full, and following them the two clauses of the open-hearth specifications—Nos. 2 and 3—which are the only ones differing from the Bessemer specifications.

Specifications for 90-lb. Bessemer Steel Rails.

1. (*a*) The entire process of manufacture and testing shall be in accordance with the best current practice, and special care shall be taken to conform to the following instructions:

(*b*) Ingots shall be kept in a vertical position in the pit heating furnaces until ready to be rolled, or until the steel in the interior has time to solidify.

(*c*) No bled ingots shall be used.

(*d*) There shall be sheared from the end of the bloom and rail formed from the top of the ingot a total discard of not less than nine (9) per cent. of the weight of the ingot, and if, from any cause, the steel does not then appear to be solid, the shearing shal continue until it does. If, by the use of any improvements in the process of making ingots, the defects known as "piping" shall be prevented, the above shearing requirements may be modified.

2. Rails shall conform to the following limits in chemical composition:

	Percentage.
Carbon	0.55 to 0.65*
Manganese	0.80 " 1.05
Phosphorus shall not exceed	0.085*
Silicon shall not exceed	.20

*Where mills cannot furnish steel rail with a phosphorus content less than 0.10 per cent. carbon shall be 0.50 to 8.60 per cent.

3. One drop test shall be made on a piece of rail not less than four feet and not more than six feet long, selected from each blow of steel. The test piece shall be taken from the top of the ingot. The rail shall be placed head upward on the supports, and be subject to an impact test of a weight falling freely through a height of seventeen feet. If any rail break when subject to this drop test, two additional tests shall be made of other rails from the same blow of steel, also taken from the top of the ingot, and if either of these latter rails fail, all the rails of the blow which they represent shall be rejected; but if both these additional pieces meet the requirements, all the rails from the blow which they represent shall be accepted, provided they conform to the other requirements of these specifications.

4. The drop-testing machine shall have a tup of 2,000 lbs. weight, the striking face of which shall have a radius of not more than 5 in., and the test rail shall be placed head upward on solid supports 3 ft. apart. The anvil block shall weigh at least 20,000 lbs., and the supports shall be part of, or firmly secured to, the anvil. The report of the drop test shall state the atmospheric temperature at the time the test was made.

5. The number of passes and speed of train shall be so regulated that on leaving the rolls at the final pass the temperature of the rail shall not exceed that which requires a shrinkage allowance at the hot saws for a 33-ft. rail of 6⅝ in. No artificial means of cooling the rails shall be used after the rails leave the rolls, nor shall they be held before sawing for the purpose of reducing their temperature.

6. The manufacturer shall furnish the inspector, daily, with carbon determinations for each blow, and a complete chemical analysis every twenty-four hours, representing the average of the other elements contained in the steel, for each day and night turn. These analyses shall be made on drillings taken from small test ingots.

7. The section of rail shall be the American Railway Association Standard, Series "A," 90-lb., and shall conform, as accurately as possible, to the templet furnished by the Railway Company, consistent with Paragraph No. 8, relative to specified weight. A variation in height of one-sixty-fourth (1-64) in. less, or one-thirty-second (1/32) in. greater than the specified height, and one-sixteenth (1/16) in. in width, shall be permitted. The section of rail shall conform perfectly to the fishing dimension.

8. The weight of the rail shall be maintained as nearly as possible, after complying with Paragraph No. 7, to that specified in contract. A variation of one-half (½) of one per cent. for an entire order will be allowed. Rails shall be accepted and paid for according to actual weights.

9. The standard length of rails shall be thirty-three (33) ft. Ten per cent. of the entire order will be accepted in shorter lengths, varying by even feet to twenty-four (24) ft., and all No. 1 rails less than 33 ft. shall be painted green on both ends. A variation of one-fourth of an inch in length from that specified will be allowed.

10. Circular holes for splice-bars shall be drilled in accordance with the plans. The holes shall accurately conform to the drawings and dimensions furnished in every respect, and shall be free from burrs.

11. Care shall be taken in hot straightening the rails, resulting in their being left in such a condition that they shall not vary throughout their entire length of 33 ft. more than four (4) in. from a straight line in any direction, when delivered to the cold straightening presses. Those which vary beyond that amount, or have short kinks, shall be classed as second quality rails, and be so stamped. The distance between supports of rails in the gagging press shall not be less than 42 in.

12. Rails shall be straight in line and surface when finished, the straightening being done while cold, smooth on head, sawed square at ends, variations to be not more than 1/32 in., and prior to shipment shall have the burr occasioned by the saw cutting removed and the ends made clean. No. 1 rails shall be free from injurious defects and flaws of all kinds.

13. The name of the maker, the weight of rail, and the month and year of manufacture shall be rolled in raised letters on the side of the web, and the number of blow shall be plainly stamped on each rail where it will not subsequently be covered by the splice-bars. Rails to be stamped on the web consecutively, A, B, C, etc., the rail from the top of the ingot being A, B next, etc. All rails from the top of the ingot; that is, "A" rails, shall have the top of the flange at each end painted yellow.

14. The inspector representing the purchaser shall have free entry to the works of the manufacturer at all times when the contract is being filled, and shall have all reasonable facilities afforded him by the manufacturer to satisfy him that the finished material is furnished in accordance with the terms of these specifications. All tests and inspection shall be made at the place of manufacture prior to shipment.

On request of the inspector the manufacturer shall furnish drillings for checking analyses.

15. No. 2 rails will be accepted up to 5 per cent. of the whole order. Rails which by reason of surface imperfections are not classed as No. 1 rails shall be considered No. 2 rails. Rails shall not be accepted as No. 2 rails having flaws of more than one-quarter (¼) of an inch in depth in the head or more than one-half (½) of an inch in depth in the base. Should flaws of less extent be so numerous, or of such a character, in the judgment of the inspector, as to render any rail unfit for recognized No. 2 rail uses, it shall be rejected. Each end of all No. 2 rails shall be painted white, in order to distinguish them. Rails rejected under the drop test will not be accepted as No. 2 rails.

16. The following classes of rails shall be loaded separately as far as practicable, excepting at the finishing of an order or the end of a rolling. In this case the different classes shall be kept separate by placing strips of wood between each class; and each shipping notice shall contain full information as to the contents of each car:

(*a*) No. 1 rails, B, C, D, etc., full lengths.
(*b*) No. 1 rails, B, C, D, etc., short lengths.
(*c*) No. 1 "A" rails; that is, rails from the top of the ingot, full length.
(*d*) No. 1 "A" rails, short lengths.
(*e*) No. 2 rails, all lengths.

Clauses in Open Hearth Specifications Differing from the Above.

1. Rails shall conform to the following limits in chemical composition:

	Percentage.
Carbon	0.63 to 0.76
Manganese	0.70 " 1.00
Phosphorus shall not exceed	0.04
Silicon shall not exceed	.20

2. Three test pieces shall be selected from each melt; these test pieces in each case being taken from the rails rolled from the top of the ingot and selected at approximately equal intervals from the melt as poured; these test pieces to be not less than 4 ft. and not more than 6 ft. long. The test rail shall be placed head upward on the support and be subjected to an impact test of a weight falling freely through a height of seventeen (17) ft. Two of these test pieces shall be tested, and if both meet the requirements, all the rails from the melt which they represent shall be accepted, provided they conform to the other requirements of these specifications. Should both of these test pieces fail all rails from the melt will be rejected. Should either of these test pieces fail, the third shall be tested, and if this third test meets the requirements, all the rails from the melt shall be accepted, provided they conform to the other requirements of these specifications. Should the third test fail, all the rails from the melt shall be rejected.

THE EARLIEST BALANCED LOCOMOTIVES.

BY HERBERT T. WALKER.
(Illustrated from the Original Drawings.)

II.

Engines "No. 2" and "No. 3" were duplicates, and a few of the drawings are illustrated in Figs. 6, 7, 8, 9 and 10. The cylinders were 16 in. diameter with a total piston stroke of 30 in.; driving wheels, 5 ft. 6 in. diameter; heating surface of firebox, 73 sq. ft.; of tubes, 769 sq. ft. Total heating surface 842 sq. ft. Reversing was effected by the Stephenson link motion shown in Fig. 10, but the valve rod, instead of working in guides as was then usual, was suspended by a link mounted loosely on the tumbling shaft. This shaft had a short arm and curved link which raised or lowered the radial link, the arm being either vertically up for fore gear as shown, or vertically down when the motion was in back gear, thus holding the radial link firmly in either position. It was never held in an intermediate position as it was not used for expansion purposes.

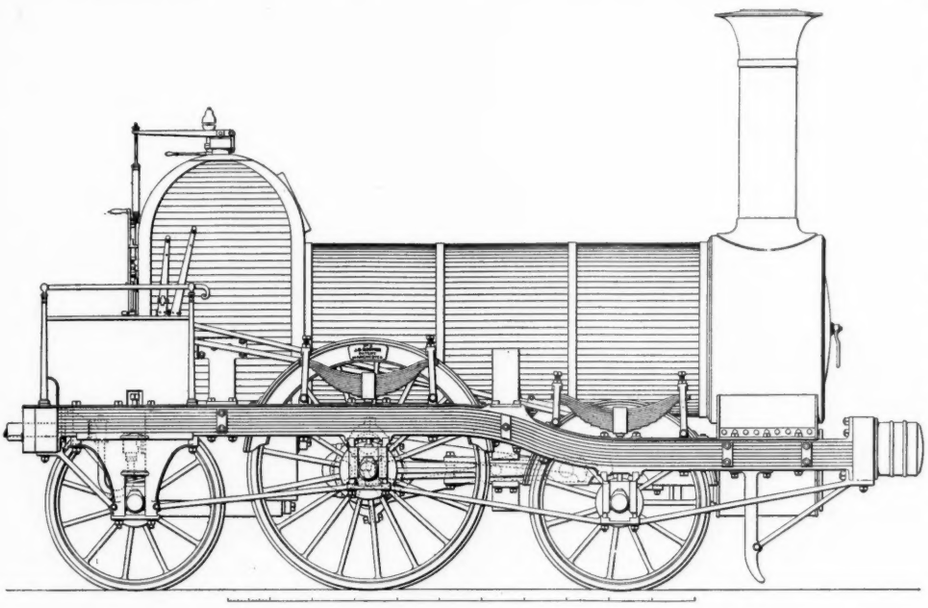


Fig. 6—Elevation of Locomotives No. 2 and No. 3, London & Brighton and South Eastern. 1845.

The rod of the expansion lever meshed with a toothed wheel operating a series of spiral gear wheels (Bodmer invented the spiral gear wheel in 1803), see Fig. 10, thereby rotating the expansion valve spindles, which were worked at a constant stroke by eccentrics. The two separate parts of the expansion valve traveled on the back of the main valve (Fig. 8), the cut-off being varied by changing the lap, as described in the previous engine.

There was a longitudinal water bridge in the firebox which received a perforated feed pipe. This pipe, having two check valves, terminated in a hemispherical socket enclosing a ball cast in one piece with a pipe provided with a swivel joint, but this joint is not shown in the drawing. The tender was provided with a similar pipe, so that when connected they formed both a feed water connection and a draft coupling between engine and tender. The feed pumps were worked from the middle axle of the tender and gave much trouble. Another source of trouble was the brakes; these were of the "skid" type and were let down onto the rails as well as being in contact with the wheels. Their action was violent, and sometimes the wheels were lifted from the rails, causing derailments. These tenders were disastrous to Bodmer, not only because of their inherent badness, but from the fact that an accident to the tender was often reported as a failure of the engine, and "the foreigner's complicated locomotives" were condemned accordingly.

One of these engines was received by the South Eastern Railway Company in July, 1845, and it was numbered 123 on their books. It did good service until May 23, 1846, when it ran off the line near Pluckley, the train being the London express from Dover. The engine driver was killed. Signs of a crushed flint-stone were found on the rail which is supposed to have caused the derailment, but stories were circulated that "the compensated mechanism" threw the engine off. This, of course, was not true, for the mechanical superintendent (the late Mr. Cudworth) and also the fireman of the engine testified that it was the steadiest running locomotive in their experience. This engine ran a total of only 16,500 miles, but it was not broken up until 1880.

The other of these two engines was received by the London, Brighton & South Coast Railway Co. in December, 1845, and was numbered 7 on the company's books. It was entirely rebuilt in 1849 as an ordinary two-crank locomotive and was broken up in 1876 with a credit of 491,825 miles. It must be explained that in Bodmer's time the South Eastern and Brighton Companies had joint locomotive stock.

At the close of 1845, after the death of H. H. Birley, the Manchester shops were given up and Bodmer moved to London, where he prepared a set of working drawings of his most remarkable locomotive. Only 14 of these drawings have escaped destruction, but the general views are complete, and three of them are reproduced in Figs. 11, 12 and 13.

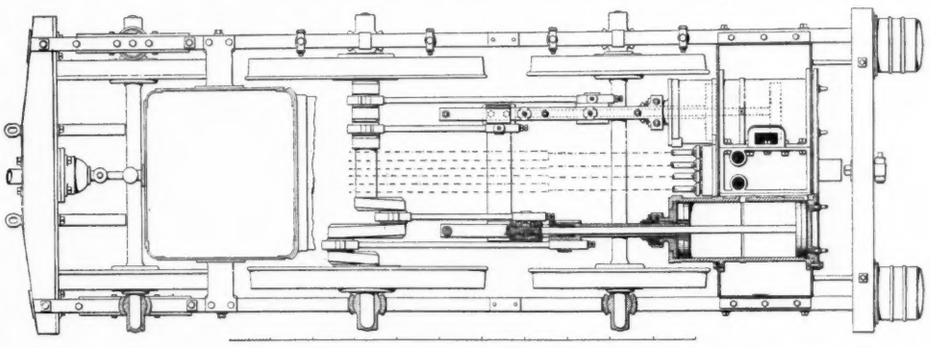


Fig. 7—Plan of Locomotives No. 2 and No. 3, London, Brighton and South Eastern. 1845.

These drawings are dated London, Feb. 17, 1846. The principal dimensions of the engine were: Cylinders, 22 in. diameter, with a total piston stroke of 24 in.; driving wheels, 7 ft. diameter; total length over the buffers, 38 ft. 7 in. It was a combined engine and tender, the tender leading wheels supporting the rear end of the engine by means of two cap-

stan screws in the engine foot-plate resting on their journal boxes, lateral motion being taken up by two helical springs bearing against the inner sides of the boxes, so that the tender could swing on the coupling pin in the center of the foot-plate, and the engine had thus virtually leading and trailing trucks. All of the wheels had helical springs except the drivers.

The frames were of the bar type, the upper and lower rails carrying heavy ◇ shaped cast iron guide bars for the equally massive cross-heads, which were of brass. The driving axle was also of brass, being cast in one piece with the wheel hubs. All brass parts in sight were polished which, with the truck axle boxes must have given the engine a handsome appearance. The main and expansion slide valves were cylindrical and concentric, the spindle of the former sliding within that of the latter. The rate of expansion was regulated by spiral gear wheels similar to the previous engines. The expansion eccentric worked the feed pumps direct and the plungers had arms fixed to the expansion spindles. The engine had the Stephenson link motion but the radius link was carried by and oscillated in a circular frame (Fig. 13), having an arm jointed to the tumbling shaft arm, instead of being moved by the usual lifting link and arm from the tumbling shaft. Spring-pressed automatic relief valves were fitted to the cylinders. The grate bars were supported by trunnions at their ends and were rocked by a rod and lever on the fireman's side. The fireman also controlled the draft by a damper, which was a sleeve closely fitting the inside of the smoke stack, like a telescope. If this sleeve was lowered to a hood surrounding the blast nozzle the draft would be stopped completely without obstructing the exhaust steam.

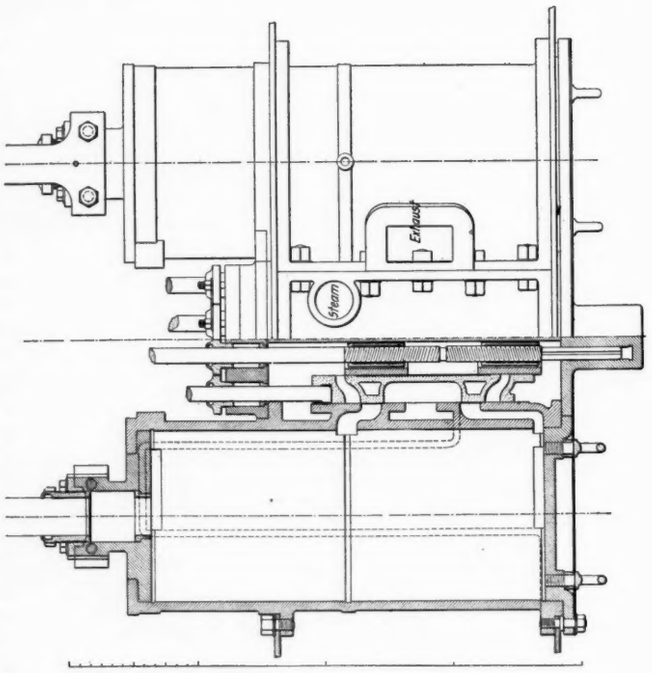


Fig. 8—Details of Cylinders and Valves; Locomotive No. 2. 1845.

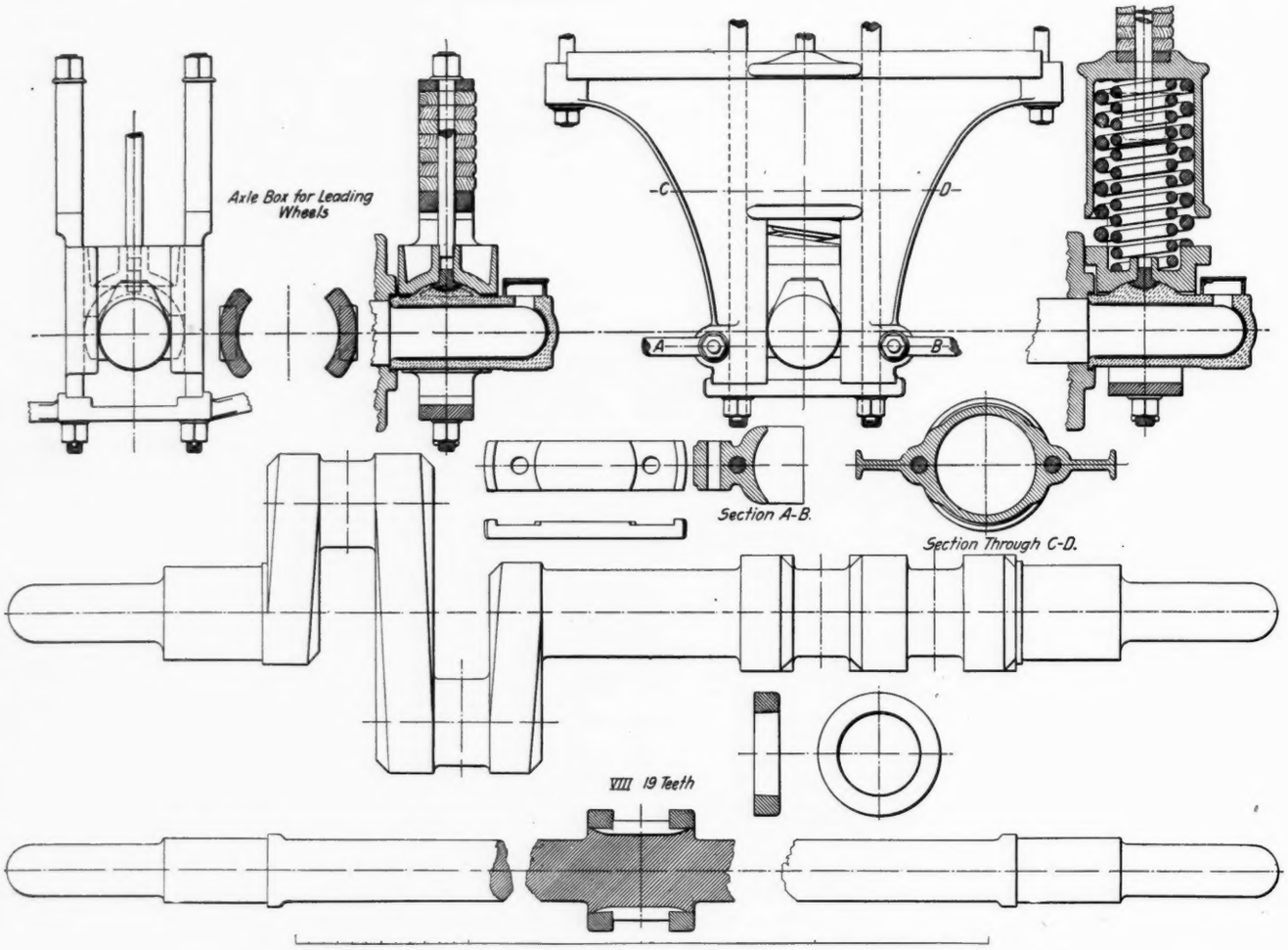


Fig. 9—Details of Axles and Axle Boxes. Locomotives No. 2 and No. 3. 1845.

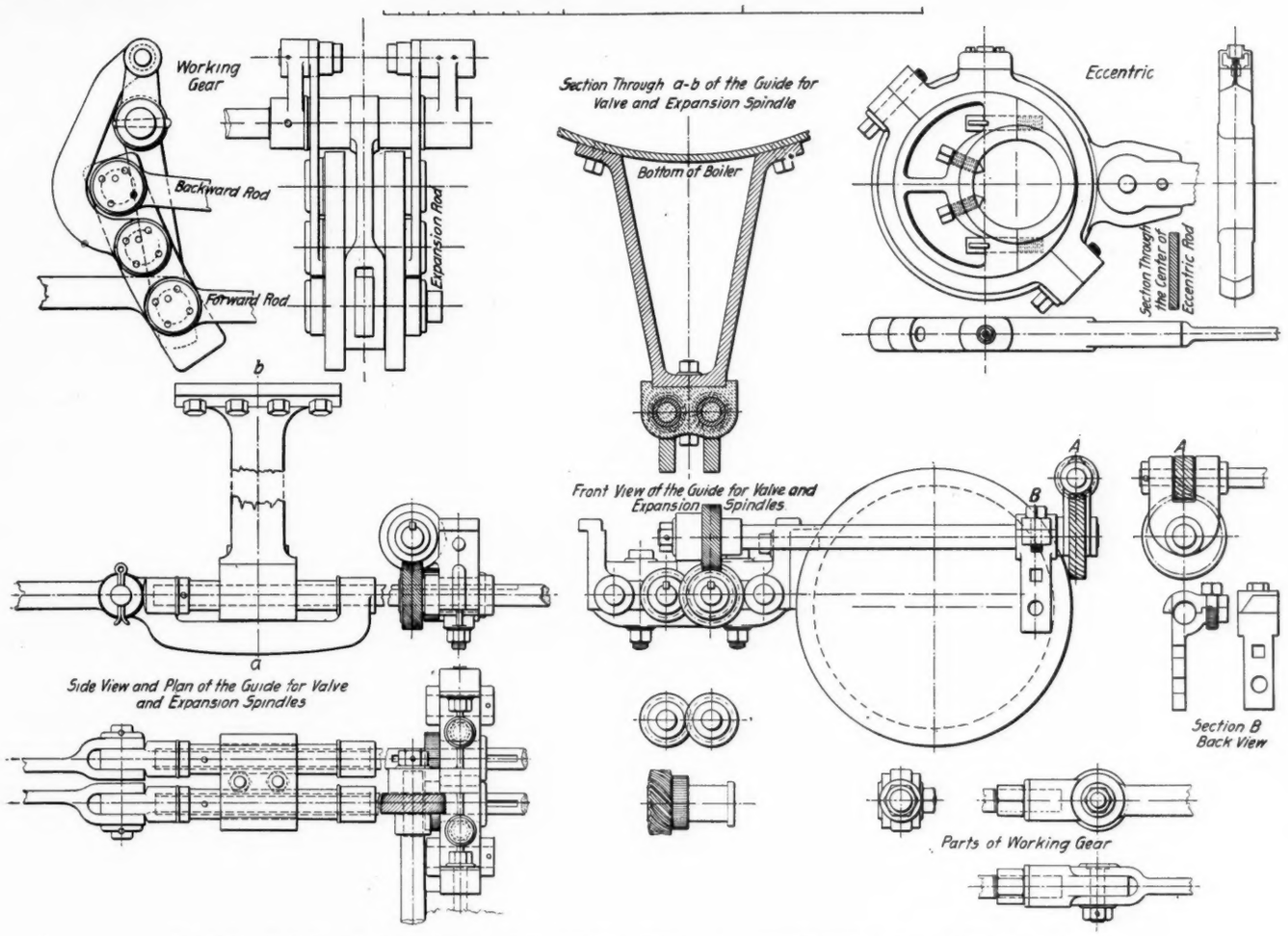

Working Gear
Backward Rod
Forward Rod
Expansion Rod
b
a
Side View and Plan of the Guide for Valve and Expansion Spindles
Section Through a-b of the Guide for Valve and Expansion Spindle
Bottom of Boiler
Front View of the Guide for Valve and Expansion Spindles
A
B
Eccentric
Section Through the Center of Eccentric Rod
Section B Back View
Parts of Working Gear

Fig. 10—Details of Reversing and Expansion Gear. Locomotives No. 2 and No. 3. 1845.

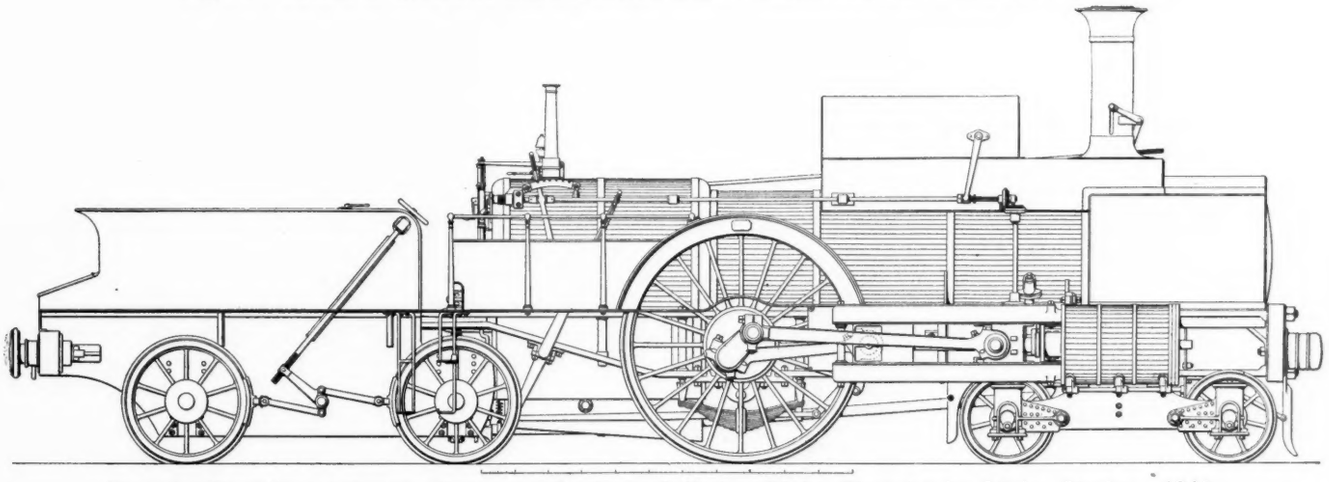


Fig. 11—Elevation of Express Passenger Engine. Cylinders 22 in. Diameter by 24 in. Stroke. 1846.

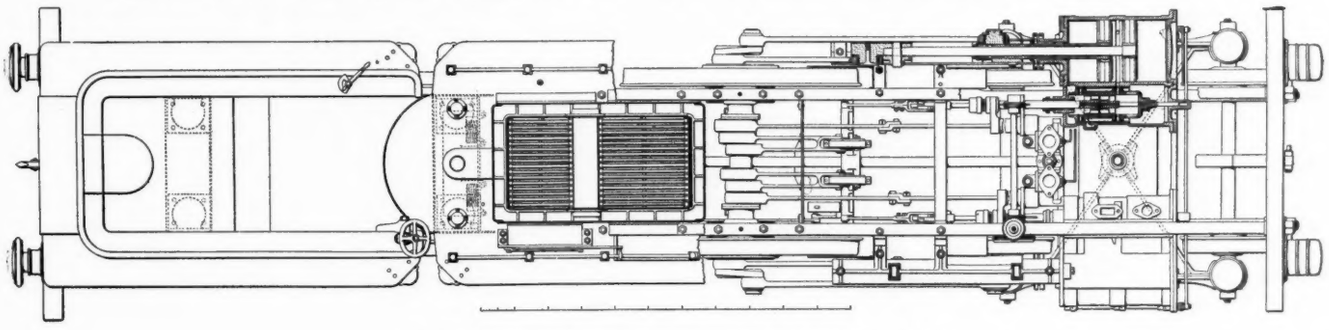


Fig. 12—Plan of Express Passenger Engine. 1846.

The extension smokebox surrounded the front part of the boiler and the steam pipes, with a further extension over the steam dome, and by deflecting plates the gasses of combustion were made to circulate around these parts before finding an exit at the stack. This was a type of superheater. The steam dome was a box-like structure with a semi-circular top and the boiler plate beneath it was perforated with small holes. The steam passed out of the dome through a pipe having a narrow slit along its top, which was flared outwardly to deflect particles of water away from the opening. A similar device has been tried recently.

Bodmer intended this engine to work at a steam pressure of 100 lbs. on the square inch, and he estimated that it would take express trains of 12 coaches. Assuming that the effective pressure on the pistons was 85 per cent. of the boiler pressure, the tractive effort of this engine would be

$$\frac{22^2 \times 24 \times 85}{84} = 11{,}754 \text{ lbs.}$$

if the heating surface (not known) was large enough to supply the cylinders with steam.

At present no evidence can be found that this engine was ever built, although the drawings show every indication of having been in the shops, for they have been ruined by oil and rough handling. Nevertheless, the design should be placed on record as the production of a masterful and far-seeing mind of 60 years ago, and it is hoped that the publication of these drawings will bring out some information regarding the road on which this engine worked.

Bodmer left England in 1848, and after living in the suburbs of Vienna, he moved to Zurich, where he resided with his son-in-law, Frederick Reishauer, who was the owner of a machine tool factory there. Bodmer designed some new tools for these works, which went far to make Reishauer a prosperous man.

Bodmer died at Zurich May 29, 1864. He affords an illustration of the fact that we are soon forgotten, for owing to his nervous, sensitive nature and retiring habits, his name was seldom mentioned in the literature of the day, and is now practically unknown.

The Actiengesellschaft für Fabrikation Reishauer'scher Werkzeuge is now doing an extensive business at Zurich, some of the machinery there being practically the same as that designed by Bodmer, as above stated. These works are now under the management of Professor A. Aeppli, who is a member of the Bodmer family, and to whose courtesy the present writer is indebted for the use of Bodmer's papers and drawings, as alluded to at the beginning of this article.

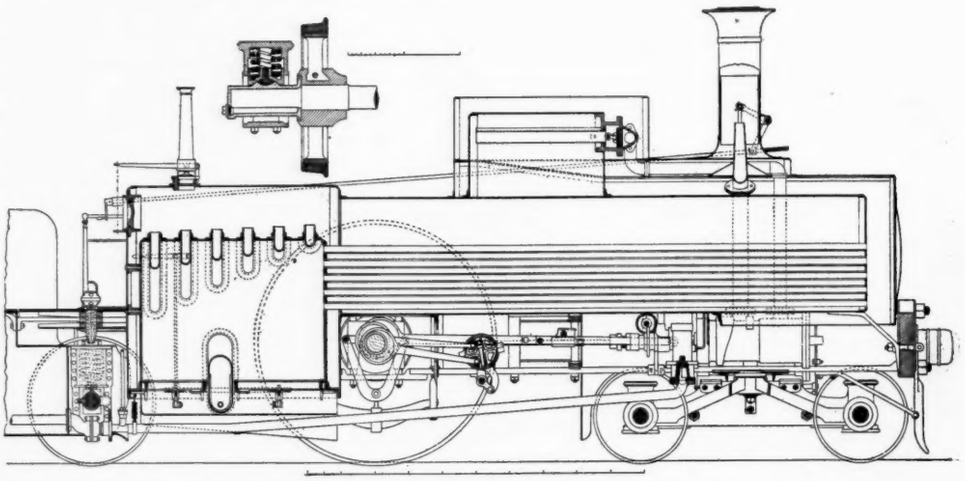


Fig. 13—Longitudinal Section of Express Passenger Engine. 1846.

FOREIGN RAILWAY NOTES.

The Ministry of Public Works of Ecuador has been authorized to negotiate with the Guayaquil & Quito for extending the road from Quito to Ibarra, and also for various extensions of the Southern Railway.

The Shantung Railway (German) has made a dividend of 4¾ per cent. for the year 1908. The manager reports that earnings are about 25 per cent. greater this year than last. The road will soon be carrying materials for the Tientsin-Pukan Railway, the bonds for which have just been sold.

SUGGESTED POSSIBILITIES OF SUPPLY DEPARTMENT MANAGEMENT.

BY GEORGE G. YEOMANS,
Assistant to President, Wabash Railroad.

More than one hundred and fifty millions of dollars are tied up in the stocks of material that are carried by 32 of the railways of the country, operating 126,548 miles of road, or a little more than 55 per cent. of the total mileage of the United States. To be exact, their annual reports for the fiscal year of 1907-8 give the amount as $156,583,071. This is unproductive capital and virtually constitutes a fixed charge of over $6,000,000 per annum. It is also interesting to observe that according to the official figures for all of the railways for the year ending June 30, 1907, which are the latest available, the material used for renewals and repairs consumed 9.72 per cent. of the total gross earnings, being the largest single item of expense except the pay of employees and interest on the funded debt.

In spite of this large drain on the treasury, there is less accurate information obtainable regarding the necessity for carrying such large stocks of material than about any of the other branches of railway operation. It seems to be generally accepted as one of the evils which must be endured, and which, in the absence of definite knowledge of the subject, must be left wholly to the judgment of different individuals, which is only another way of saying that it must be guessed at! Nearly all of the other operations of the railways have been reduced of late years to a mathematical science, and results can be deduced and comparisons made with a fair degree of accuracy.

It would seem that there should be some more or less definite relation existing between the extent of the property, the amount of transportation produced and the amount of material which it is really necessary to use in the proper or adequate repair and maintenance of the facilities, and that under normal and generally similar conditions what would be considered good practice in this respect on one road should apply to another. However that may be, the question of determining the amount of money which it is necessary for a railway to carry as a practically fixed investment in material is one of which it has been said that there is no practical solution, and yet it seems incredible that there should be no method devised for regulating the expenditure of such a vast sum, or at least of ascertaining, within reasonable limits, whether we are guessing correctly or not. The local conditions and environment, the geographical location and topographical surroundings, the distance from sources of supply and the character of the country traversed, have all been put forward as insuperable obstacles to the adoption of any

universal standard by which we can measure our own performance in this respect with that of others. Really, however, they are only circumstances tending to modify a fundamental principle.

On the other hand, it will be admitted without doubt that some roads are more extravagant in the use of material than others, and that some have more economical methods of handling and caring for their supplies than others, all of which must result in the carrying of a greater or less amount of material in stock to supply what are supposed to be the current requirements of the service. It is no part of my purpose to attempt to define the quantity of material which any railway should use in maintaining its property, but simply to point out from analogy the approximate quantity that may be considered as *necessary* or *indispensable*, and it then becomes the province of the management to determine how far they desire to go in the way of additional refinements of practice, and what amount they are willing should be invested in material for that purpose.

How then can we best determine whether or not we have money unnecessarily locked up in our storehouses that could be spared for other purposes?

Primarily by endeavoring to get a broad general view of the whole situation in such a way that without depending upon accuracy of detail, we can still determine within fairly reasonable limits what our neighbors are accomplishing in that direction, and by setting up some standard, however rough or crude, that will enable us to institute a general comparison and give us at least some faint indication of the conditions as they exist.

The main purpose underlying the carrying of material in stock is the proper maintenance and prompt repair of the permanent way, rolling stock and structures generally belonging to the railway and used in its operation, as well as for the minor additions and betterments to the property that are constantly being made. For the larger work of new construction no material is regularly carried in stock but is provided for each piece of work as it is undertaken. Our task then is to determine upon those factors of daily operation which have the most direct bearing upon the necessary use of material for repairs and maintenance and to deduce from them if possible some guide as to the amount of material that will be requisite to meet the daily needs.

It must be admitted that the amount of material properly carried in stock depends directly upon the amount which it is *necessary* to use in any given period, for the proper or adequate repair and maintenance of the property.

The amount which it is necessary to use depends principally on two things:

(1). The extent of the property to be maintained.

(2). The amount of use to which it is subjected.

In other words, the amount of material necessarily used should vary directly with the miles of track maintained, modified by the amount of service performed by all of the facilities provided, as represented by the movement of the equipment over the line. In establishing a fair comparison, therefore, it is first necessary to reduce the material in stock to a per mile of track basis, and then modify this result by the application of a divisor which shall represent the amount of use actually obtained, both from the equipment and from the facilities provided for its movement over the line.

This combination seems to be most completely expressed in terms of car miles per mile of road operated, or, in other words, the car mileage density. In this factor are represented not only the work done by the motive power and rolling equipment, e.g., the car mileage, but also the use made of all of the facilities provided for expediting its movement, such as roundhouses, coal chutes, water stations, shops, interlocking and signal apparatus, terminal facilities, etc., all of which go towards making possible a greater density of

COMPARISON OF THE AMOUNT OF MATERIAL AND SUPPLIES IN STOCK ON DIFFERENT RAILWAYS AT THE END OF THE FISCAL YEAR ENDING JUNE 30TH, 1908.

1. Road.	2. Total material and supplies. in stock.	3. Miles of road operated.	4.* Miles of track maintained.	5. Total revenue frt. & pass. 1,000 car-miles.	6. Material, per mile of track.	Rank.	7. Car-mile density, miles road.	Ratio of efficiency. 6/7.	Rank.
Group I.—No. 1	$4,727,594	2,242	4,105	$256,784	$1,152	27	114.4	10.0	23
" " 2	4,595,170	2,047	4,240	263,042	1,083	25	128.5	8.4	18
" " 3	1,164,873	568	834	74,366	1,397	30	131.0	10.7	25
" " 4.†	2,577,164	957	2,423	289,596	1,062	24	302.8	3.5	5
" " 5	2,104,197	1,446	3,158	327,463	667	15	226.4	2.9	2
" " 6.†	15,929,925	3,790	9,380	1,389,948	1,698	32	366.7	4.6	9
" " 7.†	10,000,215	3,782	8,281	959,173	1,208	29	253.6	4.8	10
Average, Group I	$41,099,138	14,832	32,421	$3,560,372	$1,269	..	240.0	5.3	..
Group II.—No. 1	$488,890	611	802	$42,813	$610	9	70.1	8.7	19
" " 2	592,184	347	676	55,411	875	21	159.6	5.5	11
" " 3	704,264	191	842	70,542	837	20	369.1	2.3	1
" " 4	431,358	442	788	55,467	547	7	125.5	4.4	7
" " 5	4,061,772	2,171	4,508	437,743	901	22	201.6	4.5	8
" " 6	4,514,054	3,992	7,370	732,226	613	10	183.5	3.3	4
" " 7	952,868	2,515	2,943	270,522	324	2	107.6	3.0	3
" " 8	3,463,507	7,489	9,449	410,588	366	3	54.8	6.7	15
" " 9	5,147,999	4,420	6,897	530,450	748	19	120.0	6.2	13
" " 10	691,192	998	1,470	108,946	470	5	109.2	4.3	6
" " 11	1,000,271	957	1,499	114,184	667	15	119.3	5.6	12
Average, Group II	$22,048,359	24,133	37,244	$2,828,892	$592	..	117.2	5.1	..
Group III.—No. 1	$5,091,313	7,631	11,408	$543,573	$446	4	71.2	6.3	14
" " 2	6,415,610	8,977	12,216	630,600	524	6	70.2	7.5	17
" " 3	6,325,634	7,499	10,074	534,292	632	13	71.3	8.9	20
" " 4	5,256,579	7,969	9,385	461,348	560	8	57.9	9.7	21
" " 5	8,219,581	6,594	8,358	378,165	984	23	57.3	17.2	30
" " 6	6,113,388	5,633	8,319	399,318	735	18	70.9	10.4	24
" " 7	12,232,476	5,781	8,173	451,090	1,498	31	78.0	19.2	32
Average, Group III	$49,654,581	50,084	67,933	$3,398,386	$731	..	67.9	10.7	..
Group IV.—No. 1	$14,639,058	9,415	13,037	$694,896	$1,123	26	73.8	15.2	29
" " 2	5,533,658	6,479	8,365	374,396	662	14	57.8	11.4	26
" " 3	3,986,304	5,064	6,390	258,738	625	12	51.1	12.2	27
" " 4	1,215,325	1,464	1,701	73,499	714	17	50.2	14.2	28
" " 5	957,388	2,499	3,241	110,014	295	1	44.0	6.7	16
" " 6	2,224,337	3,072	3,573	194,461	623	11	63.3	9.8	22
" " 7	15,224,923	9,506	12,724	657,451	1,196	28	69.1	17.3	31
Average, Group IV	$43,780,993	37,499	49,031	$2,363,455	$893	..	63.1	14.1	..
General average, 32 roads	$156,583,071	126,548	186,629	$12,151,105	$839	..	96.0	8.7	..

*Does not include trackage rights. †Fiscal year ending Dec. 31st, 1907.

NOTE.—The ranking of the roads on the basis of material per mile of track is inserted simply to show that it is not in itself a safe guide to follow.

traffic on the line under consideration, and all of which demand the use of material for their maintenance and renewal somewhat in proportion to the amount of usage to which they are subjected.

Thus one road may carry a much larger amount of material in stock per mile of track than its neighbor and apparently be making a much poorer showing, yet when considered in the light of the utilization of all its functions, as represented by its higher density, it is really justified in carrying this extra amount of material in stock, and its real standing is correctly represented by the final ratio obtained by dividing the material in stock per mile of track by the car mileage density per mile of road. Conversely, a road which has a comparatively low stock per mile of track, when considered in connection with its low density, may not in the final analysis be making a creditable record.

Using this unit as a means of instituting a rough comparison between the different roads whose reports have been consulted, the following table results:

In compiling this table, the roads represented have been divided into four groups, following roughly the grouping adopted by the Interstate Commerce Commission.

Group I. contains what may be termed eastern roads.

Group II. consists of roads located principally in the Mississippi Valley.

Group III. consists of roads occupying the northwest territory.

Group IV. consists of roads lying principally in the southwestern part of the country.

The conclusions reached from an analysis of these figures must necessarily be of a general nature, and it is from the performance of individual roads with respect to others of the same group, and from the average performances of the several groups with reference to each other, as well as to the general average of the whole, that our deductions must be drawn. I think it must be admitted, however, that the comparisons instituted in this way point very clearly to the existence of certain conditions, even if they do not represent them with a great degree of accuracy.

In attempting an analysis, it becomes necessary to first establish some standard to which the various results presented may be referred. This seems to be afforded by the individual and collective performance of the roads in Group II. The individual roads of this group present wide variations of mileage operated, car mileage density and stocks of material; collectively they are the most advantageously located, both as to the character of the country traversed and accessibility to sources of supply, and they should be expected to show the best average performance of any of the four groups, as in fact they do.

In comparing the average performance of Groups I. and II. the existence of a real relation between the density or volume of traffic and the necessary amount of material per mile of track becomes at once apparent. Just what this relation should be is not so clearly defined. It is quite evident, however, that the stock of material per mile of track should not be expected to vary directly as the car mileage density, although the method adopted for determining the ratio of efficiency would have the effect of showing that to be the case, and to this extent it is deficient. In modifying it to meet actual conditions, it becomes necessary to inquire what the influence of car mileage density on the necessary stocks of material really is.

It may be stated that on a road having a relatively low car mileage density, the value of the material consumed in repairs to rolling stock is about 35 per cent. of the total amount used for maintenance, while we find in the figures issued by the Bureau of Railway News and Statistics in 1909 that the average amount of material used by all of the railways of the country for the year 1907 in repairs to rolling stock was a little over 52 per cent. of the total.

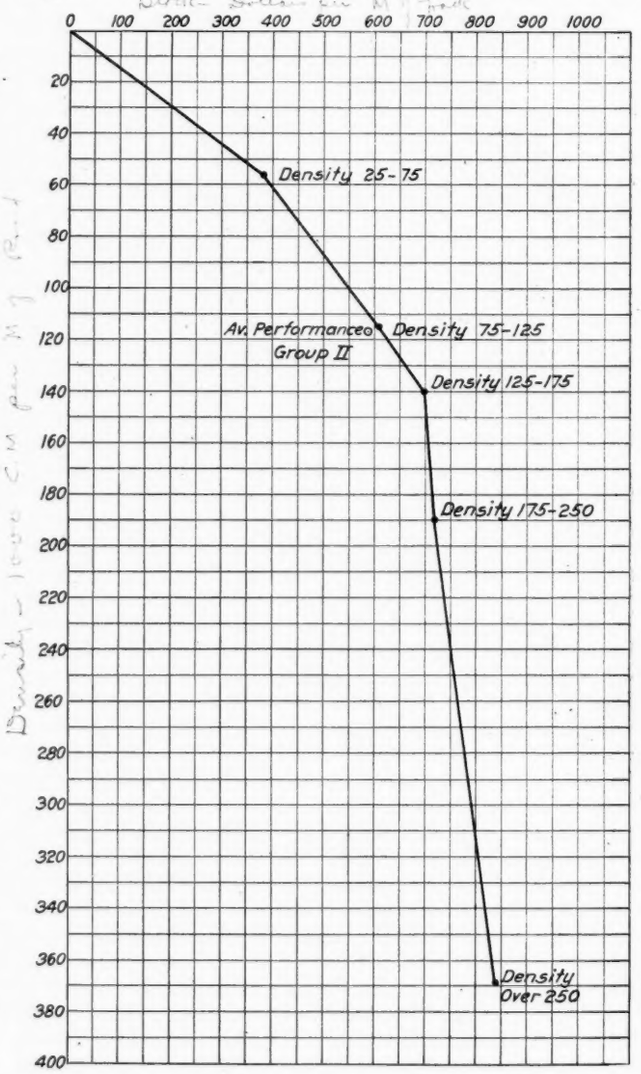
This seems to show that as the car mileage density increases the relative amounts of material required for the proper repair of the rolling stock and for the maintenance of way and structures gradually change, and while the amount of material required for the former purpose undoubtedly increases directly with the volume of the traffic, this increase applies only to a portion of the stock, and as to the remainder, the rate of increase would naturally be much less.

In an effort to determine this factor, the individual roads of our standard, Group II., were segregated into sub-groups, based primarily on their car mileage density, but with particular attention to obtaining either an equal number of roads, or an approximately similar operated mileage in each subgroup, as nearly as it was possible to do so, without destroying the value of the results from a density basis. The average performance of these various sub-groups was then calculated with the following result:

Car-mileage density.	No. of roads.	Miles operated.	Average material per mile of track.	Average density.
25 to 75....	2	8,100	$386	56.0
75 " 125....	4	8,890	608	115.2
125 " 175....	2	789	699	140.5
175 " 250....	2	6,163	722	189.8
250 " 400....	1	191	837	369.1

These results are graphically illustrated in the following diagram where the horizontal lines represent the car mileage density in units of 1,000 car miles per mile of road, and the vertical lines represent the stock of material expressed in dollars per mile of track maintained.

While it is true that the data at hand is not sufficient to support a definite conclusion, it may be said to indicate in



Group 2—Curve Showing Effect of Car Mileage Density on Necessary Stocks of Material.

a general way the influence that would normally be exerted by car mileage density on the necessary stock carried per mile of track maintained. Tested by this standard, the roads of Group I with an average density of 240 should be able to keep up necessary repairs with an average stock of $755 per mile, were it not for the fact that the general character of the country in which they operate would seem to call for a somewhat larger use of material than is the case with the roads of Group II. Allowing arbitrarily 20 per cent. on this account, which would seen ample, an average stock of $900 per mile would be indicated as sufficient.

On this assumption, the roads of Group I seem to have a total of about $12,000,000 more material than the roads of Group II require for an approximately equal amount of necessary repairs. This does not seem to be an extravagant statement when we compare the individual roads in Group I and consider that if all of the roads in the group had shown a performance equal to that of their own road No. 5, they would have saved in the aggregate $17,686,059.

Turning to the performance of the roads in Groups III and IV, we should naturally expect to find the ratio of efficiency somewhat higher than that of Groups I and II, owing to the smaller density of traffic, their geographical location, the general nature of the country traversed, its comparatively scanty population, and its distance from the principal sources of supply of manufactured articles; but there seems to be no good reason why the average performance of these two groups should not at least be as closely approximate as that of Groups I and II, and it is very questionable indeed whether local conditions actually demand that more than twice as much material per unit should be carried in stock by the roads of Group III, as required by Groups I and II. It would be natural to suppose that they could at least get along well with 50 per cent. more material, for the same amount of work, than their more favorably situated neighbors, and this would produce an average ratio of 9.5 for the group. Had they been able to operate on this basis, which certainly seems a liberal one, the seven roads in this group could have had $5,842,238 to spend for other purposes.

Be that as it may, the conditions surrounding the operations of the roads in the last two groups are so generally similar that it seems reasonable to assume that no real necessity exists for larger stocks of material on the roads of one group than on those of the other, although the figures clearly demonstrate its presence. If the seven roads in Group IV had done as well as the average performance of those in Group III, they could have released $10,676,733 for other uses, or an average of over $1,000,000 apiece, and this is on the assumption that the roads of both groups are justified in carrying twice as much material per unit of work performed as the roads farther east, which it is doubtful whether they themselves would admit.

In examining the detailed figures of the roads in Group III for the purpose of determining the bearing which their geographical situation has upon the necessary amount of stock carried, we are immediately struck by the unique performance of one of its members, which is so radically different from that of the other roads in the same group as to lead to the conclusion that some unusual or abnormal conditions must affect this particular line. This so seriously distorts the average performance of the other six roads, which together represent 89 per cent. of the operated mileage of the group, that in endeavoring to reach a normal conclusion for our general guidance, we may be justified if we note in passing the effect of this distortion.

The average performance of the other six roads of Group III with a total of 44,303 miles operated (more in fact than is contained in any of the other three groups) is as follows:

Material, per mile of track	$626
Car-mileage density	66.5
Ratio of efficiency	9.4

Referring to the "Material-Density" diagram deduced from the performance of the roads in Group II, we find that a density of 66.5 indicates a stock of $425 per mile for roads situated in Group II territory, and we may assume that had the roads of Group III been equally well located, their average performance would have been approximately as good. The difference then (viz., $201 per mile) may be attributed to the more unfavorable conditions under which they are obliged to work, and it will be noted that this difference amounts to 47 per cent. of what might be called a normal stock on a Group II line of similar density. May it not be said, therefore, that roads in the northwest and southwest territory, generally speaking, are justified in carrying about 50 per cent. more material per mile of track than roads having an approximately equal volume of traffic that are located in the Mississippi valley?

One or two other deductions may prove interesting.

(1) Considering each group separately.

If none of the individual roads had shown a poorer performance than the average of its particular group, the saving of money invested in material would have been as follows:

3	roads in Group I	$4,529,127
5	" " " II	2,081,083
2	" " " III	8,506,498
3	" " " IV	3,912,143
Total, 13 roads		$19,028,851

or an average of nearly a million and a half dollars each.

(2) Considering the 32 roads as a whole.

If those roads whose performance is above the general average had done only as well as the average of all combined, the result would have been the releasing of $27,574,663 from unproductive duty.

For the fiscal year, 1905-6, a period of great activity in the business world, the figures for 26 of the same roads, having 81 per cent. of the mileage represented in this table, showed an average stock of $665 per mile of track and a car mileage density of 106, the ratio of efficiency being 6.3. Comparing these figures with the general average given above, it will be seen that the tremendous pressure of business existing during 1906 and 1907 had a tendency to unduly influence the judgement of those responsible for the stocks of material, and resulted in increasing them to a point not warranted by the actual conditions, and difficult to recover from when the demand for material suddenly lessened. Figuring on the basis of the average of two years ago, it will be seen that the 32 railways under discussion have $43,709,852 more material on hand to-day for doing the same amount of work than they were able to get along with at that time.

Could there be any more striking illustration of the real need for some reliable guide to this branch of railway operation?

The greatest difficulty with these figures is that they are too big. Those who read will be slow to believe that such conditions exist, and will insist on some other explanation rather than the most obvious one. If the results of this analysis are divided by two, to eliminate possible errors and discrepancies, they are still worthy of attention.

That these conclusions are not necessarily overdrawn may perhaps be demonstrated by some actual figures to which the writer has recently had access. In that case, the book account showed that there was something over $1,500,000 of material in stock. The first discovery made was that there was about $300,000 worth of material on hand which had been charged to operating in the regular manner but not used. This did not appear on the books. It represented the failure of those using the material to guess their needs correctly. In less than three years time and during a period of great activity, when the demands for material were unusually heavy, more than 50 per cent. of this total amount was eliminated as unnecessary, nearly a million dollars was released from unproductive duty, and in spite of this there was no failure to fully maintain as well as to extend and improve all the transportation facilities, while at the same time the really

necessary stocks were in no way impaired and prompt and efficient service was rendered under all conditions. The comparative performance in this case expressed in the terms suggested above was as follows:

	Material, per mile of track.	Car-mileage density.	Ratio of efficiency.
June 30, 1905.....	$592	99.4	6
June 30, 1908.....	324	107.0	3

It will doubtless be objected that this is an abnormal example, but the figures which have been the subject of our analysis seem to show that it represents only the general conditions which exist on many of the railways at the present time, and will continue until a more intelligent understanding of the possibilities of this important branch of railway operation is reached.

THE CHRISTIANIA-BERGEN RAILWAY.

BY OLE W. LUND.

Bergen, the second city of Norway in population as well as in commercial importance, was long without railway communication with the eastern parts of the country and especially with Christiania. In 1875 it was resolved to build a narrow gage line from Bergen to Voss, 66 miles. This railway was opened for traffic in 1883, but to continue it across the huge snow covered mountains separating Voss from the eastern valleys and from Christiania and forming the great Cordilleras of the Scandinavian peninsula was an enterprise of such magnitude, connected with such difficulties and involving costs so heavy in proportion to the means of Norway that, notwithstanding the ardent wish to connect the two principal cities of the country by means of a railway, the realization of the idea was long delayed. But the project was never abandoned. During nearly 20 years the nature of the country and the difficulties likely to arise from the heavy snow falls, the snow slides and the snow storms were carefully studied and different lines surveyed by the engineers of the Norwegian government.

In 1894 the Norwegian Strothing (Parliament) passed a bill for building a standard gage (4 ft. 8½ in.) railway and voted the necessary means, including the amount required for rebuilding the Bergen & Voss Railway as a standard gage line.

The new railway was opened for traffic in 1908 from Bergen to Gulsvik. The Christiania-Roa section had already, as a part of the Christiania & Northern, been in operation for some years and the connecting link, Gulsvik-Roa will be finished in 1909.

The general direction of the line will be seen from the map. From Christiania the line runs north through extensive pine forests to Roa station, whence it takes a westerly course rounding the south end of the lake of Randsfjord to Hoenefos, an important industrial center, especially in the wood pulp and paper line. At Hoenefos the line crosses the Begna river on a granite bridge, 700 ft. long in nine arches of 70 ft. span, situated on the top of the big Hoenefos waterfall, once the grand center of the famous scenery of the lovely Ringerike, but which has now, except in floods, mostly disappeared through the enormous turbine pipes of the paper mills.

From Hoenefos the line passes through a big clay cutting (3,200 ft. long, up to 65 ft. deep) into the Soknedalen valley, which it follows until separated from Kroederen lake only by a narrow mountain ridge. Traversing this ridge through the Haversting tunnel (length, 7,500 ft.) the line emerges in the hill side about 500 ft. above the surface of Kroederen lake, presenting to the passenger a splendid view of this lake and of the lake and of the Norefield snow mountains just opposite. The line now descends rapidly on a 2 per

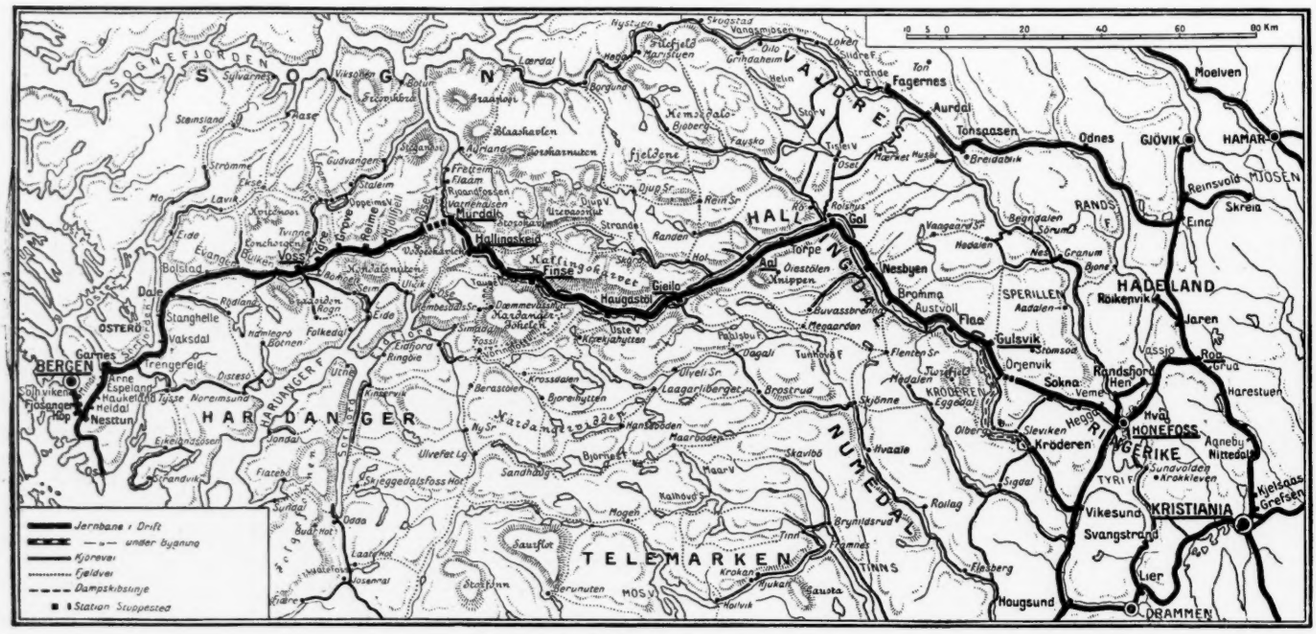


Fig. 1—Christiania-Bergen Railway.

Railways shown by heavy lines; postroads by lighter solid lines.

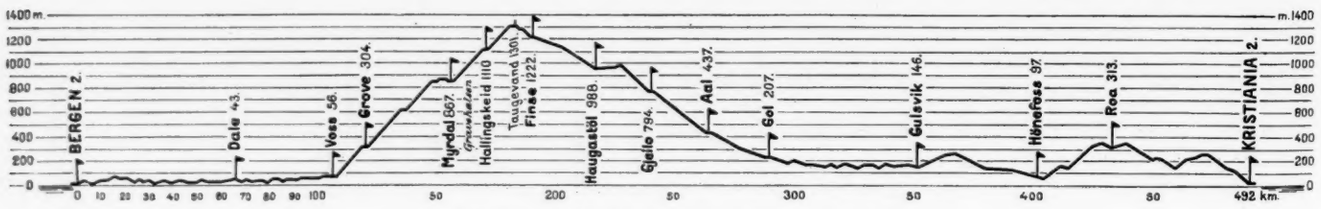


Fig. 2—Profile of Christiania-Bergen Railway.

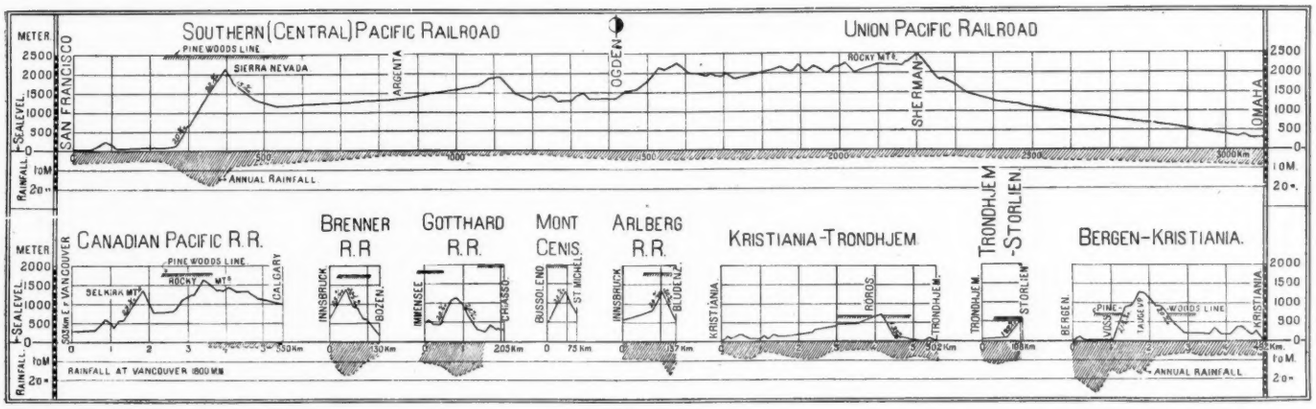


Fig. 3—Rainfall on Mountain Railways.

cent. grade to Gulsvik, a station at the north end of Kroederen lake, 88 miles from Christiania.

From Gulsvik the line, for about 62 miles, follows the great Hallingdalen valley, gradually rising from 480 ft. above the sea at Gulsvik to 1,430 ft. at Aal. Hallingdalen being one of the most important mountain valleys of Norway presents an interesting and varying scenery of exquisite beauty. There is a succession of hills and lofty mountains covered with dark pine woods and at intervals green meadows and farm houses built in the peculiar national style.

In some places the valley is narrow and seems so closed that the railway has had to creep through tunnels along the river side; then again it widens into wooded plains, the river also widening into little lakes; in other places the woods

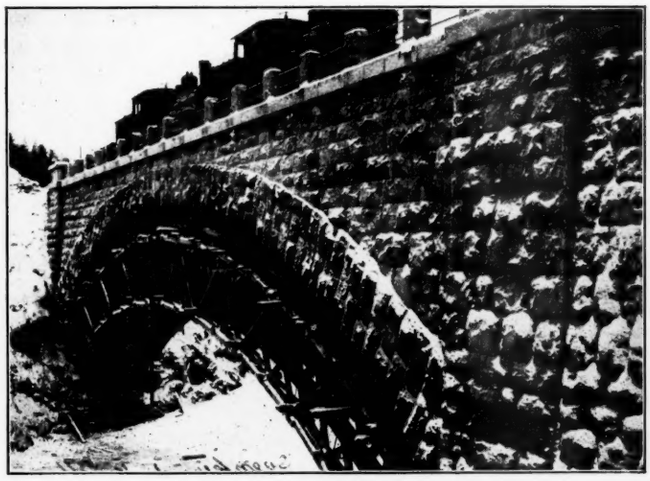


Fig. 4—Svenkerud Bridge.

Fig. 5—Snowshed; Summer.

Fig. 6—Finse; Summer.

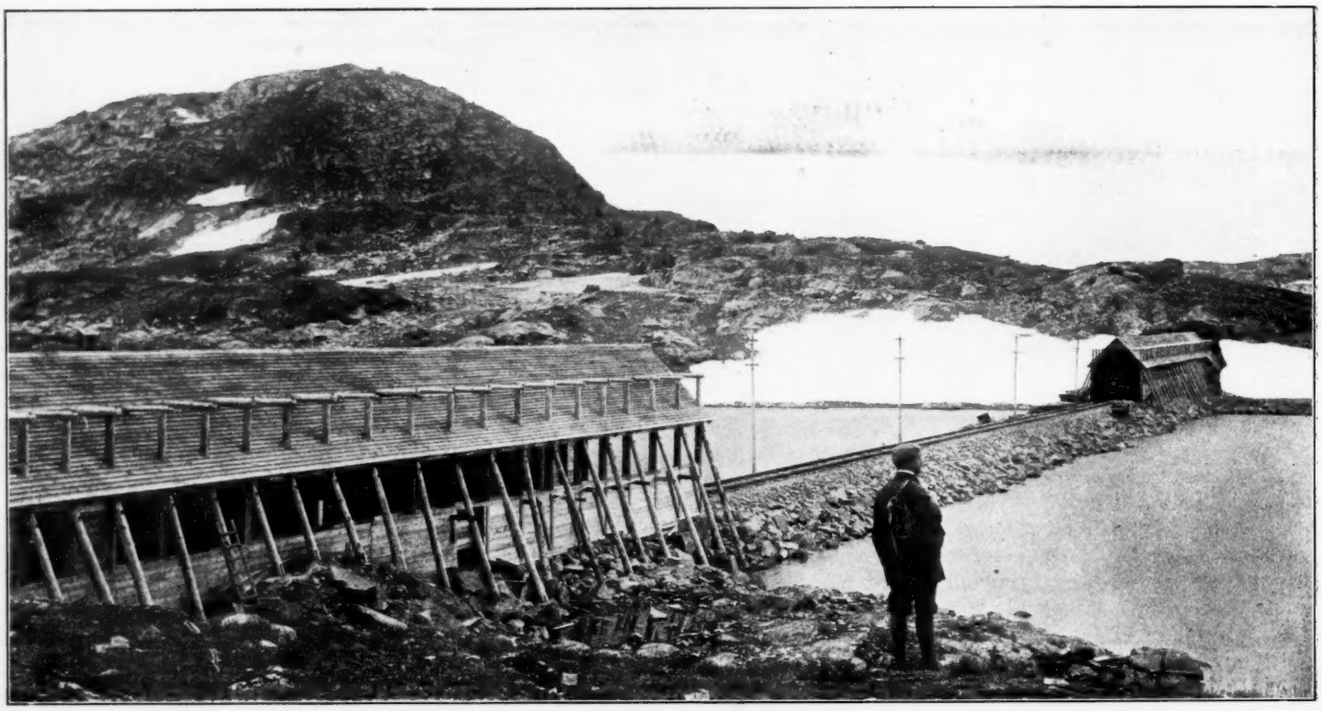


Fig. 7—Snowsheds at Tangevand; Summer.

seem to be pushed back into the steep hill sides, the broad and cultivated valley showing corn fields and groups of neat houses.

At Svenkerud, a few miles below Gol, the line crosses the river on an arched bridge of 148 ft. space. The erection of this bridge was a fine piece of engineering. The depth of the river (50 ft. at low water) together with masses of drifting ice and timber made it impossible to erect a trestle, as a provisional arch built of timber and planks had to be used as a center.

From Aal the line rises rapidly on a 2 per cent. grade. At Hol (151 miles from Christiania) it leaves the valley of the main river, entering a side valley, Ustedalen, which it follows along the foaming Usta river to Gjeilo station (157 miles, altitude 2,620 ft), the last inhabited place on the east side of the mountains.

The line still rising with the same gradient, vegetation gradually disappears and the snow mountains are seen nearer and nearer. Snow fences appear first at intervals, then in rapid succession, row after row, conveying an idea of the difficulties with which the line has to contend during the winter. The surroundings are barren; no vegetation can be seen except what can creep along the ground or find a shelter behind some projecting rock. Passing through two short tunnels and some cuttings covered with snowsheds, the passenger, looking north, catches a glimpse of the snowy peaks of the Hallingskarven glacier, and then finds himself on the shore of the Ustevand lake, 3,050 ft. above sea level, facing Hallingskarven to the north and the mountain plateaus of Hardangervidden to the south. The line here passes a

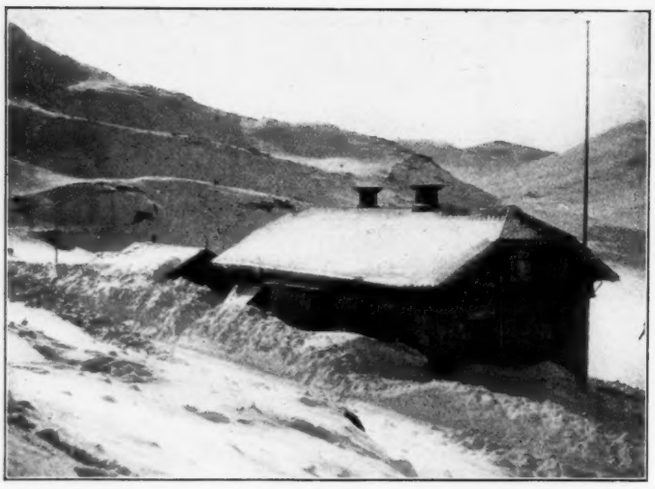


Fig. 8—Hallingskied.

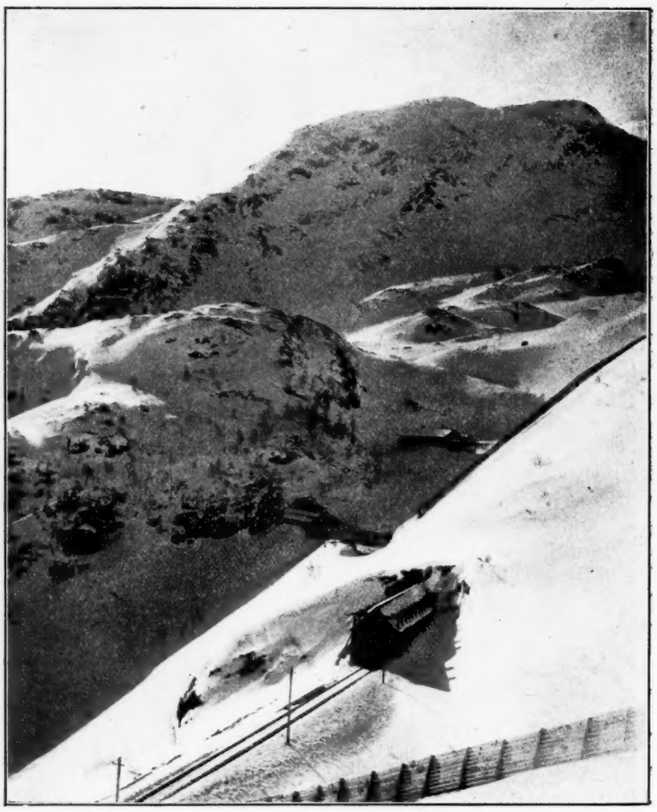


Fig. 9—West Portal of Reinunga Tunnel.

group of small cheese farms, inhabited during summer by the keepers tending the cattle and sheep.

The line runs along Ustevand lake for about 6 miles to Haugastod (171 miles, altitude 3,275 ft) and thence follows the Usteveika river and a series of little lakes until Finse (188 miles, altitude 4,000 ft.), a station situated between the two extensive glaciers of Hallingskarven and Hardangerjoekuln and close to both of them.

From Finse the line winds itself between the hills through tunnels and snow sheds until at Taugevand it reaches the watershed 4,270 ft. above sea level. On the Taugevand lake the ice, as a rule, does not melt away until August—if it does melt away at all.

From Taugevand the line descends rapidly, 2.2 per cent. grade, through a great many snowsheds between the tunnels into the wild. Moldaadalen valley, skirting several little lakes.

Having crossed the Moldaa river on a stone arch bridge,

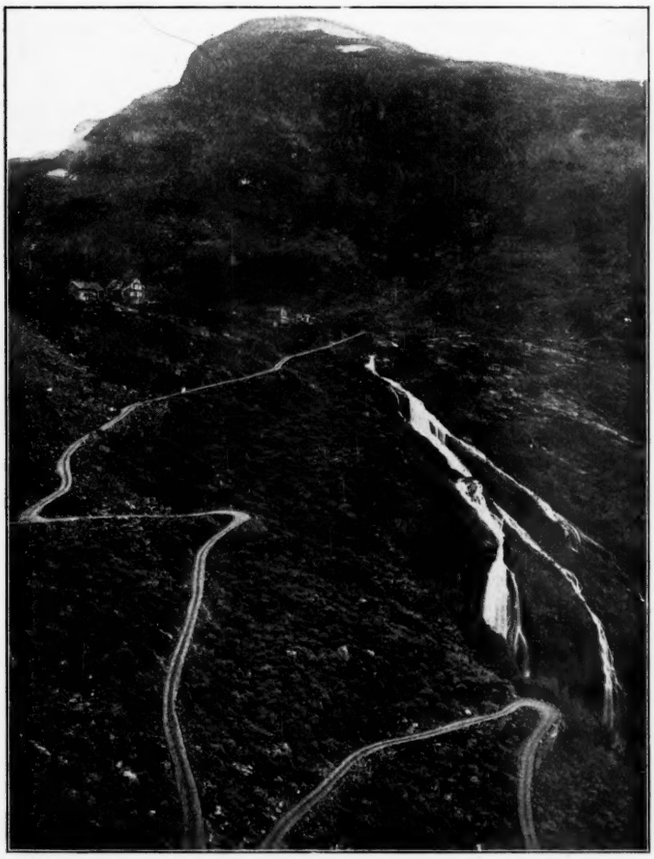


Fig. 10—Highway in Flaamdalen Valley; Summer.

the line runs along the steep and wild mountain side, the passenger looking down from a great height into Reinungavand lake and the narrow and picturesque Flaamdal valley enclosed between precipitous mountain sides. Then the train plunges into the Reinunga tunnel (6,600 ft. long), at the west end of which is Myrdalen station (209 miles, altitude 2,850 ft.), from which a steep highway winds down the mountain side to the innermost head of the Sognefjord at Flaam.

Immediately after leaving Myrdalen, the train runs into the Gravehalsen tunnel, 3.3 miles long, being the longest tunnel in Norway and nearly level. The west end of the tunnel is at Opset, at the head of the wild and picturesque Raundalen valley, along which the line descends rapidly on a 2.2 per cent. grade to the village of Voss (240 miles, altitude 185 ft.). All along the Raundalen valley the line has been cut into the mountain sides, with a succession of heavy cuttings and short tunnels.

Voss used to be the terminus of the Bergen & Voss Railway, built originally in the years 1876 to 1883 as a narrow gage line, but now changed to standard. A few miles west of Voss the line crosses the Strandelven river on a fine granite arch of 135 ft. span and then runs along the narrow but deep fjords, Bolstadfjord and Soerfjord, winding in

Fig. 11—Bolstadfjord; Summer.

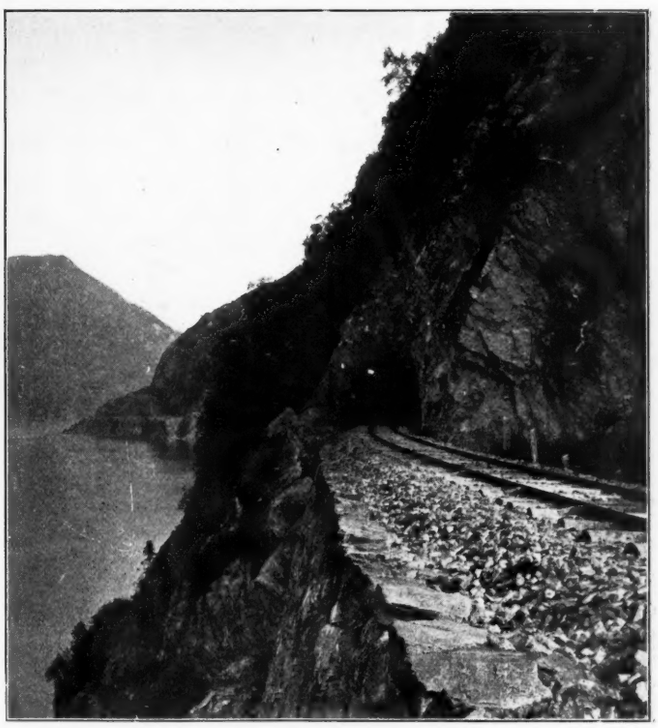


Fig. 12—Soerfjord; Summer.

sharp curves along the deep mountain shores and presenting a fine example of Norwegian fjord scenery. The rock work has been extremely heavy on this section of the line, the whole road being nothing but a series of big rock cuttings and tunnels, some of them of considerable length. On the 66 miles between Voss and Bergen there are no less than 51 tunnels, having a total length of 5.3 miles. The country, though rugged, is covered by rich vegetation wherever the

steepness of the mountain slopes does not prevent trees from growing. Through this magnificent scenery the line runs to the ancient and interesting city of Bergen, 306 miles from Christiania.

The prominent features of the Bergen Railway are the height to which it rises above the pinewoods line, the severe climate, the enormous masses of snow on the mountain range to be crossed and the great number of tunnels.

Section.	Distance, miles.	Tunnels—No.	Tunnels—Total length, miles.
Christiania to Finse	188	70	6.7
Finse to Voss	52	74	12
Voss to Bergen	66	51	5.3
Total	306	195	24.0

All these tunnels have been driven through solid and hard rock so that only in exceptional cases has it been necessary

Fig. 13—Between Bergen and Voss; Summer.

to line them with masonry, and then only in very short lengths.

Besides the tunnels, the earth work and, still more, the rock work has been exceedingly heavy. The biggest rock work is on the Bergen-Voss section, but by far the greatest difficulties have been encountered in crossing the mountains between Voss and Aal.

The bridges have been built to a great extent of granite.

The minimum radius of the curves is 800 ft.; there are a great many curves. Indeed, it would not be very far from the truth to say that the whole line is nothing but curves, tangents of any length occurring only as an exception.

Rails weighing 60 pounds to the yard have been used in the mountain crossing between Voss and Aal, and also from Christiania to Hoenefos, owing to the necessity of using heavier engines on the steep grades of these sections. On the other parts of the line, where the grades are easier, 50-pound rails have been laid down.

Table of Locomotives.

Engine.	Diam. of wheels.	Weight, tons—On driv'g wheels.	Weight, tons—Total; work'g order.	Weight, tons—Tender with coal & water.	Length over buffers, inc. tender.
6-cpld pass'gr, larger type	56⅞ in.	36	50	30	51 ft. 3 in.
6-cpld. pass'gr,smaller type	55½ "	28	36	24	47 " 9 "
8-coupled, freight	48⅝ "	47	55	36	53 " 3 "

The passenger cars have bogie trucks and are fitted with vestibules. The locomotives and cars have all been built in Norway. The cost of the Christiania and Bergen Railway has been, including rolling stock:

Christiania to Roa	38 miles.	£350,000
Roa to Voss	202 "	2,250,000
Voss to Bergen	66 "	850,000
Total, Christiania to Bergen	306 miles.	£3,450,000

The difficulties encountered in the construction of this railway have been of no common kind, especially across the mountains between Aal and Voss. On this part of the line the winter temperature may be 20 degrees Fahrenheit below zero, or even lower, and as a rule is only say 10 degrees Fahrenheit above zero. The winter lasts from the end of September to the middle of June and during that time no work could be done on the highest parts of the line except tunneling. At the watershed the snow scarcely ever disappears.

The mountains being uninhabited, provisions and materials of every kind had to be dragged on steep mountain roads that were, moreover, often impassible for days on account of snowstorms. Consequently, the difficulties of provisioning the men were considerable. To surmount these difficulties and brave the dangers of the wintry snow storms between glaciers and precipitous mountains required no small amount of energy and courage on the part of the engineers and the men.

The line croses the mountain plateau known as Hardangeroidden at a height of 4,268 ft. above sea level in a region approaching the eternal snows and running between the extensive glaciers of Hallingjoekulen and Hallingskarven. Several European and American railways reach the same, or even a greater height. But, for a fair comparison of climatic conditions, not only the altitude but also the latitude should be considered. The mountain part of the Southern Pacific and the Union Pacific lies between 41 degrees and 43 degrees north, latitude *i. e.*, on the latitude of Messina and Naples. The Canadian Pacific lies between 51 degrees and 52 degrees

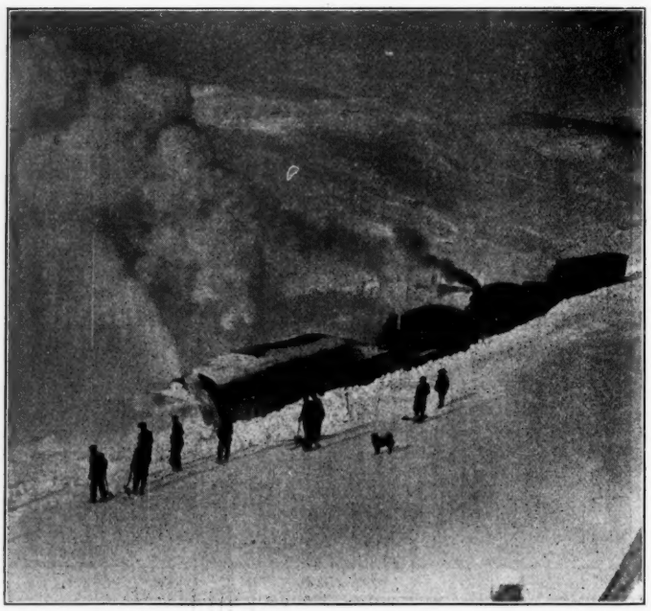


Fig. 14—Rotary at Work in Hard Packed Snow.

north latitude, and the Swiss railways between 46 degrees and 47 degrees north latitude. The Bergen Railway lies between 61 degrees and 62 degrees north latitude.

As long as a railway runs through pine woods the snow is likely to cause little or no difficulty because a pine forest, even if the trees be small and thinly scattered, offers a very good protection against drifting snow. The altitude of the railway relative to the pine woods line therefore will prove a fair standard of comparison. The annual rainfall, of course, is another important item.

The accompanying diagram shows profiles, pine woods lines and annual rainfall on some mountain railways. It appears from the diagram that for more than 60 miles the Bergen Railway lies above the pine woods line and, in fact, for 30 miles is above the tree line altogether, whereas all other

mountain railways, European and American, are considerably below the pine woods line. The mountain crossing of the Pacific railways are much higher and longer than the corresponding part of the Bergen Railway, but, in return, the former are situated at a more southern latitude. On the Bergen Railway the conifers cease to grow at the height of 2,000 or 2,300 ft. above sea level, whereas the pine woods line on the Canadian Pacific is about 6,000 ft. and on the Southern Pacific about 8,000 ft. above sea level.

It further appears from the diagram that the rainfall on the Southern Pacific, being uniform over the low country near San Francisco, increases gradually on the western slope of the Sierra Nevada range until, on reaching the highest

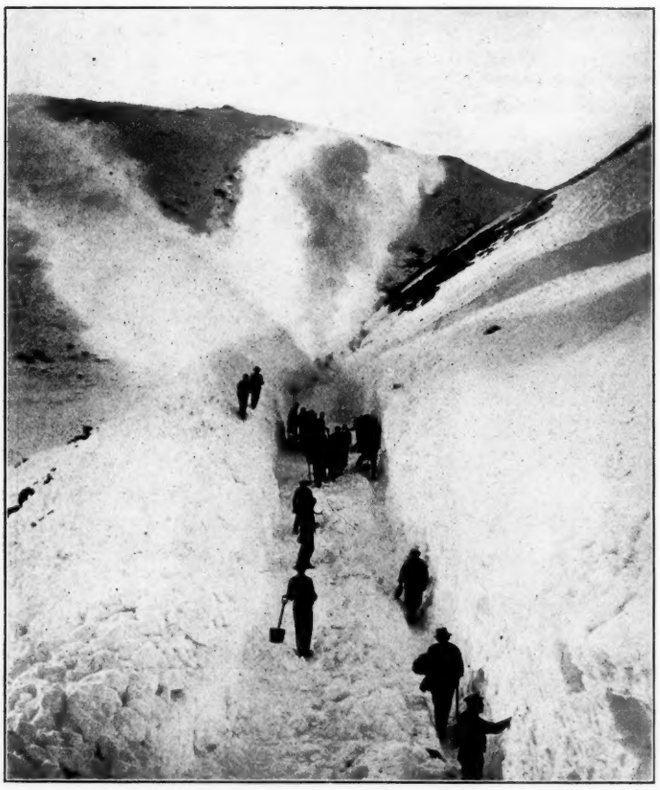


Fig. 15—Rotary Following Up Shovelers.

point of the railway, it is about three times what it is near the coast. On the other side of the watershed it decreases rapidly, so that on the 1,100 miles of prairie to the Rocky mountains the annual depth of rain is only 8 to 12 inches. The prairie, in spite of the absence of trees, does not present any serious snow hindrances, the annual depth of rain being so small. The reason is that the Sierra Nevadas are high enough to make most of the rainfall coming in from the Pacific stop on the western slope.

Much more trouble is caused by snow on the Canadian Pacific between the Selkirk mountains and the Rocky mountains, the Selkirk mountains not being high enough to prevent a large portion of the rainfall from passing them. Just this is also the case on the Bergen Railway, where the annual rainfall, amounting as it does, to 8 ft., is much greater than on the Pacific railways, or on any other mountain railway. The Bergen Railway consequently has to contend with much more snow.

The difficulties and hindrances caused by the snow cannot, however, be measured by the quantity of snow only, the drifting of the snow greatly increasing the difficulties of keeping the track clear. If the snow falls heavy and wet it sticks as it comes down and, when once removed from the track, it will cause no further inconvenience. Such is also the case if mild weather sets in after a fall of dry snow. That is what does generally take place in southern latitudes.

But in the Norwegian mountains the snow as a rule comes down quite dry as a fine dust and keeps dry during the whole winter, so that it is put in motion by every puff of wind. If the track is cleared it will keep clear only until the next wind stirs up the snow and fills up the track.

To keep the line open three methods of protection are used: 1. Raising the subgrade so as to form an embankment high enough to make the wind blow the snow off and keep the track clear. That certainly is the best and safest expedient, but it can be used only in a comparatively level country because in rough country or along a steep hill-side to avoid all cuttings would mean to make the embankments so high that the cost of construction would exceed reasonable limits. On the Bergen Railway therefore this expedient has been used only on a few miles along the Ustevand lake and in a few other places where the country is comparatively flat. 2. Arrangements aiming at diverting the snow from the line (snow fences) or at covering the line (snow sheds).

The snow fences are board fences, 6 to 10 ft. high, or even higher, erected at some distance from the track to stop the drifting snow by making it accumulate in the sheltered space on the lee side of the fence. If snow fences are placed in the right position and at the right distance from the track they will be successful. They consequently must be so placed as to suit the predominant wind. If drifting snow is to be expected from more than one quarter several snow sheds must be erected. They are also used to divert the current of the drifting snow from the line. On the Bergen Railway, as well as on other Norwegian railways snow fences are extensively used and have proved a great success.

If snow fences are not sufficient snow sheds must be used for completely covering the line.

About 31 miles of snow fences and 13 miles of snow sheds have already been built on the Bergen Railway, and more

Fig. 16—Snow Fence and Shed.

will be added wherever experience shows that they are needed.

3. Snow plows for removing the snow from the track.

During the winter months every locomotive is provided with a small plow fixed in front of it, which is sufficient to clear away a few inches or even a foot of snow or small snow drifts. In case of a heavy snowfall a rotary plow is used, throwing the snow sideways away from the track.

The rotary was invented in America some 20 years ago. The rotaries used on the Bergen Railway are of the American type, but they have been modified so as to suit Norwegian conditions and they are built in Norway. On a car about 26 ft. long is mounted a locomotive boiler and a 600 or 700-h.p. steam engine, making the suction fan in front revolve at the rate of 150 revolutions a minute. Although the snow

is dry, the wind packs it extremely hard in the drifts, so hard indeed that a horse can walk upon it without breaking through. It has been necessary therefore to compose the fan of a number of large knives, cutting the snow and drawing into the fan box, whence the centrifugal force throws it out as an enormous jet with a velocity of 60 ft. a second.

The weight of the rotary, with its tender, is about 100 tons on 10 axles. It is pushed by one or more locomotives, the fan being broad enough to clear to the full clearance limits for rolling stock. If the snow is more than 10 ft. deep the rotary cannot work and it is then necessary first to shovel away the top of the snow drift so as to reduce the depth of the snow to not more than 10 ft. In one of the accompanying photographs the men have shoveled away the top of the snow drift and the rotary is advancing, clearing the track completely.

The result of the use of snow fences, snow sheds and rotary snow plows is that traffic on the Bergen Railway is carried on during the winter as regularly as at any other time. The winter of 1908-1909 was the first regular traffic year of the Bergen Railway, and there were no stoppages at all caused by the snow during that winter.

The Christiania-Bergen Railway was built under the general supervision of the chief engineer of the Norwegian Government Railways, Mr. Fleischer. The resident engineers were: Mr. Lekve succeeded, after his decease, by Mr. Skavlan, also deceased, for the Finse-Voss section; and Mr. Stoeren for the section east of Finse.

The rebuilding of the Bergen & Voss from a narrow gage to standard gage was superintended by Mr. Fasting.

The rotary snow plows were designed by Mr. Hoff, director of the wagon and traction department of the Norwegian Railways and built by A. L. Thune, Christiania.

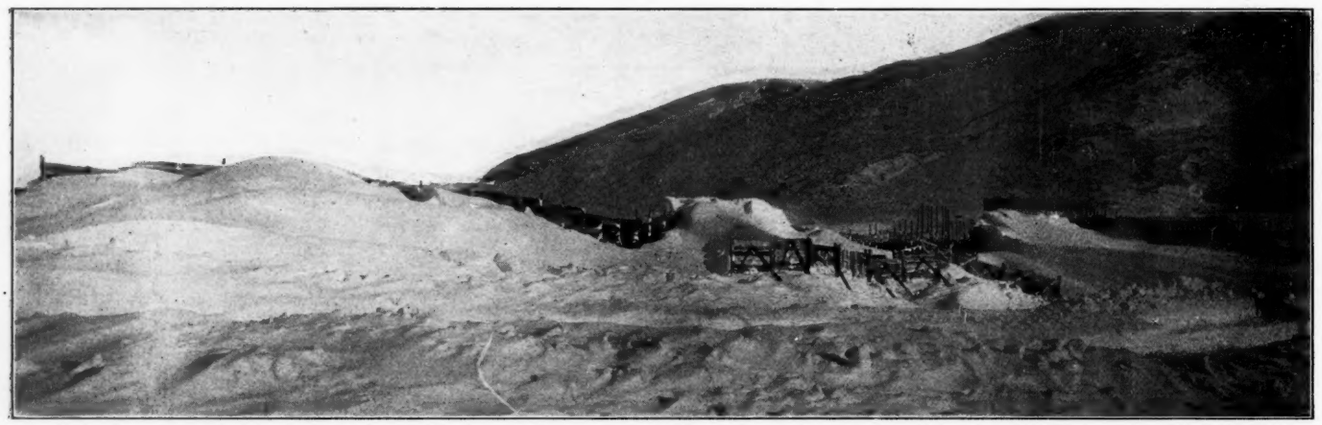


Fig. 17—Extensive Snowfence Protection.

ROBERT PITCAIRN.

Robert Pitcairn, who served the Pennsylvania Railroad consecutively for 53 years, from 1853 until 1906, died at his home in Pittsburgh July 25. Mr. Pitcairn was born May 6, 1836, at Johnstone, Scotland. In 1853 he became a telegraph operator on the Pennsylvania at Duncansville, near Altoona, and in years following he served successively as clerk in the general superintendent's office at Altoona; superintendent of the Middle division; superintendent of transportation and in charge of various divisions; superintendent of the Pittsburgh division, general agent and superintendent of the Pittsburgh division, and resident assistant to the president at Pittsburgh. From 1897 until 1906 he was a member of the advisory committee of the relief department.

Mr. Pitcairn had many outside interests. He knew the traffic possibilities and conditions of the Pittsburgh district perhaps better than any man living, and throughout his career he impersonated the unusual combination of a thoroughly skillful traffic adviser and an exceptional operating man. It would be an excellent thing for railway and commercial development alike if all operating men knew their traffic as Mr. Pitcairn did.

The following comments on Mr. Pitcairn's career are taken from the *Pittsburgh Dispatch:*

It was quite a romance that Pitcairn, the boy, should have secured his first employment through Andrew Carnegie, the boy, who was also a messenger at that time; that the two should not considerably differ in age; that they should have been born not many miles separated in Scotland, the one at Dunfermline and the other at Johnstone; that their coming to America should have been at nearly the same time; that these almost neighbor boys should both come to Pittsburgh, and that without the one knowing the other previously the boy, Pitcairn, should have been helped to a position by the boy, Carnegie.

John and Agnes Pitcairn were father and mother of Robert and several other children, several of whom still live. Robert was born May, 1836. The father, a thrifty mechanic, had accumulated some money and had profitable employment from the time of his arrival in America in 1846, when Robert was a robust lad of 10 years. The boy had the quickness and energy that came of a good, hardy lineage through many generations of Scots in comfortable circumstances, some of them having attained to considerable celebrity.

From the moment Robert received his appointment as messenger boy he began to attract the attention of those about him by his quickness and brightness. At 15 he began to learn telegraphy and, at the same time, attended night school. Within a year or two he became so proficient at the key that he was made operator and ticket agent at Mountain House, Duncansville, Blair County. In 1854, when the business of the Pennsylvania had been vastly enhanced by the construction of the Gallitzen tunnel and other improvements, he was transferred to the general superintendent's office at Altoona, one of the most important between Pittsburgh and Philadelphia.

With amazing rapidity Pitcairn mastered the details from the greatest to the smallest in this office and soon was appointed train dispatcher and clerk to the general superintendent. In 1859 he was sent to Fort Wayne, Ind., and did a great work in completing the organization of this western line of the Pennsylvania. In 1860 he was made superintendent of the Middle division, which included the lines between Conemaugh and Mifflintown.

At the outbreak of the war Superintendent Pitcairn found his capacity for organization and direction put to a new test. He was made master of transportation and in this office was also assistant to the general superintendent, acting for him

and taking charge of divisions when he was absent or ill. He took charge of the Pittsburgh division, from Pittsburgh to Altoona, and the Middle division, from Altoona to Harrisburg, in addition to his duties as master of transportation, and it is a matter of the history of the time that over no other road or divisions of roads was there so little of delay and confusion as upon the lines under control of Robert Pitcairn. Practically all of the troops and supplies from the vast West passed over these lines, yet with all this tremendous convergence and congestion it was rare that a train departed from schedule time unless the forces of nature, such as flood and blizard, united with the forces of the war to produce confusion.

A supreme test came during the invasion of Maryland and Pennsylvania. Then there was indeed "hurrying to and fro," as though a Waterloo for the North were in sight. Without relaxing in the least his vigilance over the prodigious activities of the Pittsburgh and Middle divisions, Superintendent Pitcairn also took charge, following the battle of Antietam, of all the railway movements in the Cumberland valley and it is probable that no other one man contributed more toward the victories of the North at Gettysburg and lesser towns, for all the resources of the roads, which almost reached the scenes of conflict, were operated like clockwork in the movement of troops, of commissary, of ammunition, of succor for the wounded, of all that pertained to mighty warfare. His judgment in the movement of trains and of making connections in such bewildering circumstances was considered infallible and he had in his possession testimonials of highest praise from railway and military officials.

Following the war Mr. Pitcairn was sent to Pittsburgh as superintendent of the Pittsburgh division, strangely enough succeeding Andrew Carnegie, this division having become one of the most important of the entire system on account of the tremendous development of the iron and coal business. He was also general agent and here, maintaining a splendid operation of every movement that came within the sphere of his duty, he held these offices, whose intricacies are all a mystery to the lay mind, from the time of his transfer until 1902.

In that year it was decided to create the office of assistant to the president to reside in Pittsburgh; an office which would relieve the president, residing in Philadelphia, from certain personal oversight. It was an office, however, really created for Robert Pitcairn, still efficient in the old places, wearing his nearly 70 years lightly; but it was thought by the higher officials of the company that it was due to one who had done such strenuous service that he should be relieved of a portion of his burdensome duties and at the same time be the recipient of a special honor. That it was a very distinctive, as well as distinguished, honor was evident from the act creating the office, as it was decreed that the office should become obsolete with the retirement of Robert Pitcairn.

All this gave rise to a curious confusion of opinion, almost amusing in one of its phases, pathetic and almost tragic in another. Years previous to 1902 Robert Pitcairn had been largely instrumental in securing from the company the enactment of a rule that every employee and official of the company, having reached the age of 70 and having served a specified number of years, should be retired with a certain proportion of the salary formerly received. In his anxiety for the comfort and fine treatment of old servants he had not thought of his own case.

It was always his expectation that he would die in the harness. He never wanted to be laid on the shelf as useless. Arriving one day at the age of 70 he found himself subject to his own rule, which he had intended for the good of others, but which was not good for him. Moreover, it was his conviction that as the office of resident assistant to the president was created only for him it was not intended that the 70-year rule should apply to it. The officials of the company, many of them young men who had no intimate knowledge of the enormous work done by Mr. Pitcairn, insisted that the operation of the 70-year rule applied in all cases; that if it were set aside once it might be again and again; and so by the operation of his own rule Robert Pitcairn was declared suspended.

It was a fact freely admitted by all members of the family of Mr. Pitcairn, and by all who have associated with him in church, club or social assembly, that the retired assistant to the president was never "quite the same" after. He felt injured by his retirement. The salary was nothing to him, but he wanted the work, and above all he did not wish to feel that his name was erased from the long list of the honored and active. He lost his accustomed spirit and vivacity. He could not endure inaction. He felt himself yet in fine fettle for the work in hand.

Being a railway man he did not care for travel. Suggestion of new scenes and peoples did not appeal to him. It did not matter to him that he was made a victim of his own official beheading machinery. Nothing could convince him that his case should not have been made exceptional, and that so long as he desired to work the privilege of working should be his. That these conditions speedily affected his health and greatly hastened his death is the opinion of all who knew him best. Yet at times even in his feeblest moments he would, with his Scotch sense of humor, see the comic side of the act of retirement and grimly speak of his having been guillotined by his own rule.

INFLUENCE OF ASH ON VALUE OF COAL IN LOCOMOTIVE SERVICE.*

All motive power officers, locomotive engineers and firemen are familiar with the trouble occasioned by what is designated as "bad coal," which makes clinkers as well as fills the firebox with ashes, so that the capacity of the locomotive is very materially reduced, resulting in delays and various other troubles, due not to inferiority in the coal itself, but to the fact that the ash in or associated with the fuel is excessive. But so far as the author is aware, no attempt has been made in railway service to place a definite value upon the effect of variation in quantity of ash, therefore it is the purpose of this paper to more particularly present two diagrams, Figs. 1 and 2, the first illustrating value of coal fuel with varying percentages of ash, and the second, showing the results of experiments from which Fig. 1 is derived.

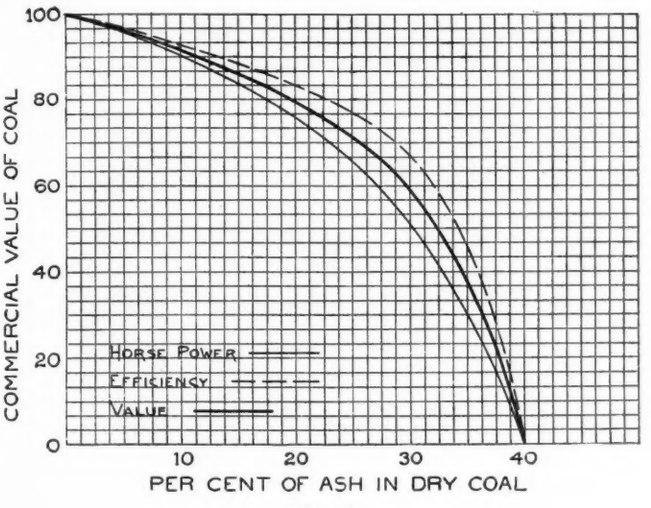


Fig. 1.

These experiments were made with a Babcock & Wilcox

*Presented at the April meeting of the Western Railway Club by A. Bement, Consulting Engineer, Chicago.

boiler served with a chain grate stoker. A special lot of four cars of what is known as No. 4 washed coal from Williamson county, Illinois, were provided to insure that no effect produced would be due to irregularity in size. In preparation it was passed over a screen having round perforations ¼ in. in diameter, and through a screen having round perforations ¾ in. in diameter. The coal as received contained approxi-

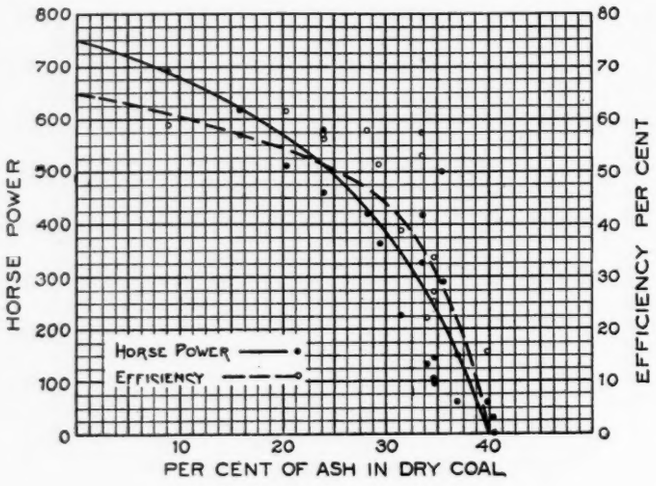


Fig. 2.

mately 8 per cent. ash. The first experiment was run with this coal in condition as received. In the test of the following day a small quantity of ash-pit refuse was mixed with it, and on each succeeding day a gradually increasing quantity of ash-pit refuse was added to the coal and thoroughly mixed. This process was continued until the efficiency and capacity dropped to zero, or in other words, until there was no water evaporated from the coal burned, notwithstanding the fact that 60 per cent. of the fuel composition was pure coal.

The above mentioned experiments were conducted by the author for the Commonwealth Edison Co., Chicago, and while they refer to conditions of stationary boiler service rather than of locomotive, they are the only data of this character which has been produced, although so far as the author's observations have gone, it appears that the conclusions have a useful application in any steam-making service. Some results plotted from tests made by the United States Geological Survey using coal containing ash ranging from 5 to 15 per cent. on hand-fired grates, conform very closely to the corresponding portion of the curve shown in Fig. 2.

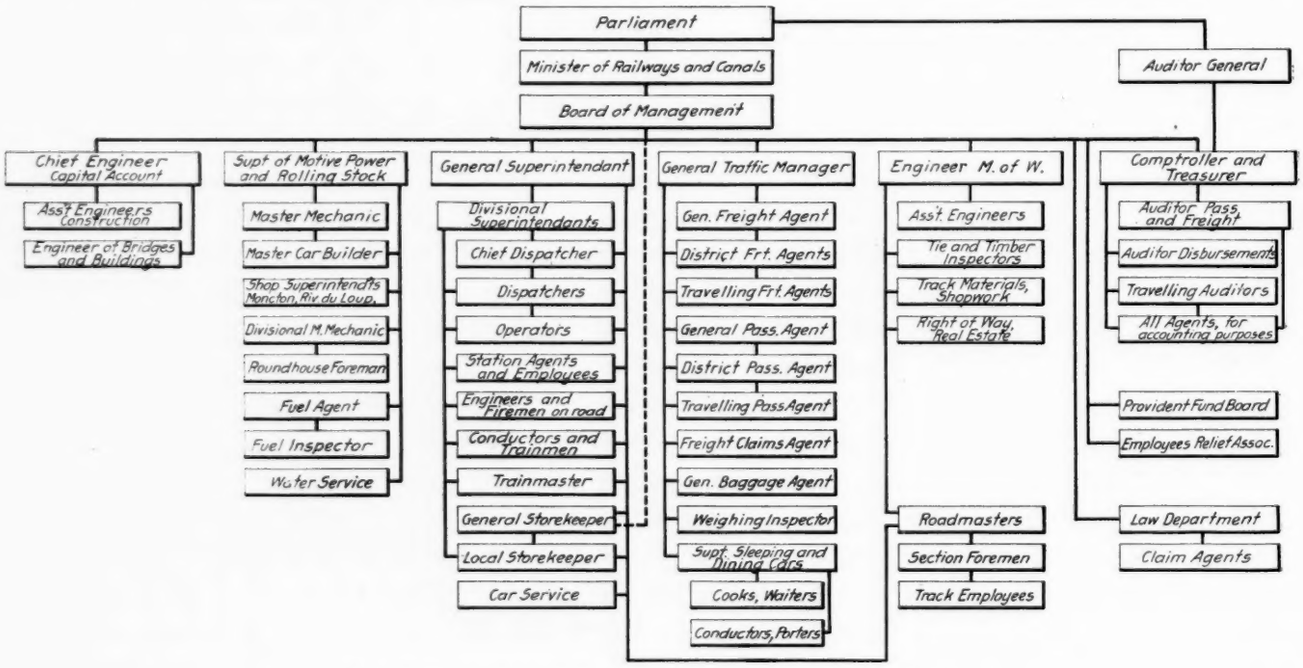
The matter of ash in locomotive fuel may be considered from two standpoints; one, the desirability of employing fuel which is low in ash, the other, the removal of the ash as rapidly as it accumulates, each tending to the same result. It has been the author's experience that by frequently shaking the grate, the ash accumulation could be so disposed of that an engine would come in at the end of a division with the fire in apparently as good condition as when leaving. This, however, added very materially to the labor required on an engine, but more recently, grate-shaking apparatus, which is operated by steam, has been proposed and also employed to a limited extent.

The whole matter of the ash in locomotive fuel is one of the very first importance, probably much greater than has been realized. The characteristic of smallness in size, which cuts a considerable figure in stationary practice, is largely absent in the case of locomotives, for the reason that the fine coal is carried out of the stack by the intense draft and does not clog cause of trouble with the railway fuel, which results in many the fuel to such harmful extent, leaving the ash as the greatest so-called engine failures.

NEW ORGANIZATION OF CANADIAN GOVERNMENT RAILWAYS.

The Canadian Government Railway system is made up of 1,1751 miles of line, of which 1,452 miles comprise the Intercolonial division. Never a success financially, some important modifications have recently been made in the organization, which is now as shown in the accompanying diagram. It will be observed that the organization is purely divisional, except for the control over the roadmasters, which the general superintendent shares with the engineer of maintenance of way.

The auditor general is co-ordinate with the minister of railways and canals.



New Organization of the Canadian Government Railways.

THE DOCKETS OF THE INTERSTATE COMMERCE COMMISSION.

BY LOGAN G. MCPHERSON.

II.

Two or three of the cases concerning through routes and joint rates, bring up the question as to the extent to which a railway company is justified in endeavoring to promote the carriage of traffic over its own rails, even though a producing region not on its own line or a market not on its own line may not receive as complete service or as low rates as though its own rails extended from such producing region and to such market. The commission orders the Pennsylvania Railroad to establish a through route on coal to Walbrook, a station within the limits of the city of Baltimore, but on the Western Maryland railway. The Chamber of Commerce of the city of Milwaukee complains that the Illinois Central and Rock Island railways have advanced certain grain rates from certain non-competitive stations to Milwaukee to a higher level than is charged to Chicago. The former road made the adjustment requested, but the latter contended that, inasmuch as the grain market at Chicago is as good as that at Milwaukee, it does not unjustly discriminate against farmers shipping from the non-competitive stations by endeavoring to secure the long haul to Chicago, whereas the routing to Milwaukee would give it a shorter haul to a junction point whence it would be taken by another railway. The commission, however, ordered the establishment of the same rates from the stations in question to Milwaukee as to Chicago, pointing out that the railway grants the same rates to these rival markets on certain other kinds of grain. A similar complaint arises in the South, the Central of Georgia refusing to establish through routes and joint rates on cottonseed in carloads from points in Alabama and Georgia to Jacksonville, Fla., although according through routes and joint rates from the same points to Savannah, Ga. The Chicago and North Western system cancelled through rates on salt from Washburn, Wis., in order that the shipments of salt would move entirely over its own lines from Duluth, stating that the through rates from Washburn divided, without increasing, the business and diminishing its revenue through the compulsion to divide the rate. The commission held that Washburn is unduly discriminated against and ordered a readjustment.

Various coal mining companies of Colorado protest because of the absence of through routes and joint rates from the mines of the Walsenburg district to points in Texas and New Mexico via Amarillo. The Santa Fe claims that it has abundant means to supply the needs of these towns with coal from mines upon its own line which it desires to foster; that it is unnecessary to make the through rates requested from the Walsenburg district, as they will involve an unnecessary handling of cars and retard their efficient movement. This case has not been decided.

Chicago and Cincinnati complain that the rates from those cities on manufactures to Atlanta are unduly higher than the rates from the industrial centers of the North Atlantic seaboard to that city. This is the contention of many years' standing. The railways leading from the Ohio river into the Southeast claim that they are not justified in making as low rates per ton per mile to that territory as are forced upon the railways leading along the Atlantic seaboard by the competition of the coastwise vessels. Another long-standing contention underlies the complaints made by Reno, Nev., and Phoenix, Ariz. These cities protest against their rates from the East being higher than rates to the Pacific Coast, which, the railways state, are forced by water competition. These cases belong in the same category with that of Spokane and are all to be argued before the commission in the autumn. The railway commission of Alabama and the shippers of Georgia protest against the advances of from 2 to 4 cents on grain and grain products, meat and meat products, from Ohio and Mississippi river crossings to Atlanta, Chattanooga,

TABLE VI.—*Community Complaints.*

	Territorial groups.										Total.	Decided in favor of complainant.	Dismissed, withdrawn or indefinitely postponed.	Adjusted or compromised and withdrawn.	Not decided.
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.					
Indianapolis, Ind.	..	..	1	..	..	..	..	..	..	..	1	½	½	..	..
Saginaw and Flint, Mich.	..	..	1	..	..	..	..	..	..	..	1	..	..	..	1
State of North Carolina	..	..	..	..	1	..	..	..	..	..	1	..	..	..	1
Chicago and Cincinnati	..	..	..	..	1	..	..	..	..	..	1	..	..	..	1
Bainbridge, Ga.	..	..	..	..	1	..	..	..	..	..	1	..	1	..	..
Johnson City, Tenn.	..	..	..	..	1	..	..	..	..	..	1	½	½	..	..
Alabama and Georgia	..	..	..	..	1	..	..	..	..	..	1	..	..	..	1
Fort Dodge, Iowa	..	..	..	..	..	1	..	..	..	..	1	..	1	..	..
Des Moines, Iowa	..	..	..	..	..	2	..	..	..	..	2	..	..	..	2
Green Bay, Wis.	..	..	..	..	..	1	..	..	..	..	1	..	1	..	..
Ottumwa, Iowa	..	..	..	..	..	2	..	..	..	..	2	..	..	..	2
Anthony, Kan.	..	..	..	..	..	..	..	1	..	..	1	1	..	..	..
Little Rock, Ark.	..	..	..	..	..	..	..	1	..	..	1	..	1	..	..
Vicksburg, Miss.	..	..	..	..	..	..	..	..	1	..	1	..	1	..	..
Shreveport, La.	..	..	..	..	..	..	..	..	2	..	2	..	..	2	..
Munroe, La.	..	..	..	..	..	..	..	..	1	..	1	..	1	..	..
Santa Rosa, New Mex.	..	..	..	..	..	..	..	..	1	..	1	..	1	..	..
Railroad Commission of Texas	..	..	..	..	..	..	..	..	1	..	1	..	..	..	1
Reno, Nev.	..	..	..	..	..	..	..	..	..	1	1	..	..	..	1
Phoenix, Ariz.	..	..	..	..	..	..	..	..	..	5	5	..	..	..	5
Totals.	..	..	2	..	5	6	..	2	6	6	27	2	8	2	15

TABLE VII.—*Incidental Service.*

	Territorial groups.										Total.	Decided in favor of complainant.	Dismissed, withdrawn or indefinitely postponed.	Adjusted or compromised and withdrawn.	Not decided.
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.					
Switching	..	2	..	..	..	1	..	1	1	2	7	1	..	4	2
Switch connection	..	2	2	..	..	2	..	..	..	..	6	..	2	1	3
Reconsigning	..	..	..	..	..	..	..	3	1	..	4	1	2	..	1
Milling and compressing in transit	1	1	1	..	2	3	..	2	1	..	11	3	..	..	8
Demurrage	..	1	..	1	..	..	..	..	1	..	3	..	1	1	1
Track storage	..	4	..	..	..	..	..	..	..	..	4	3	..	..	1
Storage	..	1	..	..	1	..	..	1	..	..	3	..	3	..	..
Elevation	..	1	..	..	1	2	2	2	..	..	8	3	3	1	1
Carload minimum	..	..	1	..	..	3	1	3	..	3	11	4	5	..	2
Carload, loading and unloading	..	..	..	..	..	4	..	..	..	..	4	..	..	..	4
Miscellaneous	1	2	..	..	3	3	1	1	..	..	11	3	4	1	3
Totals.	2	14	4	1	7	18	4	13	4	5	72	18	20	8	26

and other points in the Southeast. The defendants deny that the advances are unjust or unreasonable. The railway commission of Texas protests as to the advances in rates ranging from 6 to 10 per cent. from St. Louis and Kansas City to Southwestern territory, which took effect August 10, 1908. The complainant alleges that the increase is an arbitrary and unlawful exaction. The defendants state that the rates previously in effect were never sufficient to produce adequate revenue. The advances were doubtless made, in part at least, in the endeavor to offset, to a certain extent, on interstate traffic the devastation of revenue caused by the reductions made by the western and southwestern states in the tariffs applying to intrastate traffic.

The only complaints as to switching, of more than passing importance, are from the merchants and jobbers of San Francisco and Los Angeles, asking the abolition of a switching charge of $2.50 per car made on shipments to and from industry tracks in those cities, stating that similar charges are not made in other cities. This is a respect in which the practice on the Pacific coast has long been different from that at the principal cities of the East, where the competition has not only been far more severe but where the traffic is far greater. The population of the whole state of California, for example, hardly exceeds that of the city of Chicago. Two ladies who own and operate a farm in one of the interior states complain of the refusal of a railway to construct a switch connection with their farm. At a formal hearing, at the locality, the commission found that the connection would not furnish sufficient business to warrant the outlay, and, moreover, ascertained that the traffic produced by the farm moved principally as intrastate shipments. It was obliged to dismiss the complaint; but the two ladies, not accepting the decision with equanimity, have never ceased to bombard the commission, the President, and members of the Cabinet with letters of protest, taking it to heart that their desire to have Mr. Harriman, Mr. Hill, and other prominent railway presidents subpoenaed has never been gratified. Millers of rice at Houston, Tex., allege that a reconsigning in transit arrangement is not allowed on rice from Louisiana points to Houston, whereas it is allowed on rice from Texas points to Louisiana. The defendants state that there is no unjust discrimination; that compliance with the complainants' request would force the sale of Louisiana rice at Houston, which draws an ample supply from the Texas rice fields. There are complaints from the South, that the railways unduly discriminate against independent cotton compresses in favor of the Atlantic Compress Company. This the railways deny. The commission holds that the storage charges on carload shipments of fruit and produce at Pittsburgh are not unreasonable. It reduces the track storage charges on hay at New York; but rules that the railways are not obliged to grant as long a period for the free storage of flour at Philadelphia as at New York, holding that competition at New York which does not exist at Philadelphia justifies the longer free time, and states that if the defendants voluntarily extend the time at Philadelphia they must treat alike all points similarly situated, and therefrom might arise the duty to extend such benefit to every other non-competitive point. The commission suggests that the practice in the New York and Philadelphia elevators of supplying grain to make up for scalage deduction, being different from that in Baltimore, may be prejudicial to the latter city, and that the practice in the various cities be equalized. On complaint of dealers in grain and flour at Atlanta and other Georgia cities, that the carriers have unduly discriminated against them in favor of Nashville by allowing elevation, reshipping and other privileges in that city, the commission orders that the privileges complained of at Nashville be discontinued.

On complaint of a grain company at Milwaukee, that a railway did not allow it transit privileges, although it accorded such privileges to competing shippers, the defendant stated that it did not allow transit account except to shippers who controlled elevators or at least portions of elevators, and that inasmuch as it could not accommodate all shippers who leased portions of elevators it had cancelled all such leases. The complaint thereupon was dismissed.

A tangle arose at Omaha because of a railway company refusing to pay elevation allowance on cars switched to another line, but not returned to it within the stipulated 48 hours. The commission ruled that the non-return of the cars was not sufficient reason for not paying the elevation, and on the various items of this complaint allows reparation exceeding $10,000. A complaint that unlawful rebates had been paid on several thousand cars of grain and provisions at Little Rock and Argenta, Ark., and that an elevator built by a railway at Little Rock, and worth at least $220,000, was rented to a grain dealer for $1 per annum, brought about the summary deposition of the freight traffic manager of the railway complained of. Many of the complaints as to the carload minimum are based upon the furnishing by a railway of a larger car than requested by the shipper and then charging for the full minimum applicable to the larger car. The commission holds that in such a case the minimum charged should be on the smaller car ordered by the shipper. It holds that when two smaller cars are furnished instead of a larger car ordered by the shipper, the minimum applying on the larger car shall be applied to the two smaller cars; that the surplus loaded in the second of the smaller cars shall not be charged at less-than-carload rate. It holds that in the far Northwest, where the charge for live stock is still made by the carload, the rate per car applying on a specified capacity subject to an increase of 3½ per cent. for each additional foot in case a larger car is furnished, there shall be a reduction at the rate of 3½ per cent. per foot in case a smaller car is furnished. A singular complaint is that arising from various shipments of coke from furnaces in western Pennsylvania, West Virginia and Ohio to Globe, Ariz., via El Paso, Tex., on which the actual weight was charged from El Paso. The rule of the carrier provides that a minimum weight should be charged, which was found to be in excess of the weight to which the cars could be loaded with coke. In the various cases constituting this complaint the shipper petitions that the railway be relieved from the provisions of its published tariff by not being obliged to collect the charge covering the difference between the specified minimum weight and the actual weight of the load. Various cases constitute a complaint asking reparation on divers carloads of furniture shipped principally from points in the Middle West to San Francisco, which were charged at the minimum carload weight, which was in excess of the actual weight, it being alleged that each car was loaded to its full capacity. These cases, which were industriously garnered by a contingent fee lawyer, were dismissed, with the exception of a few in which the loading was of mantels and one or two other kinds of furniture which it was found could not be loaded to the minimum weight.

Wholesale fruit and produce shippers of Chicago, Minneapolis and St. Paul complain that although the railways for many years had loaded and unloaded carloads of fruit and vegetables, they had abolished this practice, thus compelling the complainants to load and unload such cars, and allege that this practice imposes an unreasonable and unjust charge upon the shippers. The defendants state that the prvious practice was unjustly burdensome, that the new rule is just and reasonable and in accord with the general practice whereunder the lower rate for carload shipments relieves the carrier of the expense of loading and unloading the car. In the Chicago case the commission held, that the railways be required to deliver free of charge at the car door fruit and vegetables, when shipped in packages, and that they receive such packages either at the car door or at their stations; that they should make a charge not exceeding 1 cent per hundred pounds for removing such packages from the car and

distributing in lots to the owners. The other points have not been decided.

The commission held that it is not part of the carrier's duty to bear the expense of the transfer of goods from the shipper's place of business to the carrier's station of cars, and that allowances made for this service to the sugar refineries were in the nature of rebates and violated the law, and that the representative of the packing company accepted these terms. The packing company, however, denied that it was notified of or accepted the extra charge, and asked refund of the $20. This was ordered by the commission, on the ground that the extra charge was not embodied in the published tariffs of the railway. The railway company hereafter will be obliged to incorporate the extra charge in its tariff

TABLE VIII.—RECAPITULATION.

	Territorial groups.													
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	Total.	Decided in favor of complainant.	Dismissed, withdrawn or indefinitely postponed.	Adjusted or compromised and withdrawn.	Not decided.
Foodstuffs	..	4	2	2	3	3	2	15	2	2	35	12	3	11	9
Miscellaneous raw material	..	3	3	2	9	1	..	3	..	..	21	10	4	3	4
Manufactures	1	4	6	..	6	5	1	6	2	1	32	7	3	4	18
Lumber, coal, oil and ice	1	8	4	..	1	5	1	15	7	..	42	13	8	7	14
Through routes and rates	..	3	1	1	3	3	..	2	2	1	16	3	2	5	6
Community complaints	..	..	2	..	5	6	..	2	6	6	27	2	8	2	15
Incidental service	2	14	4	1	7	18	4	13	4	5	72	18	20	8	26
Totals	4	36	22	6	34	41	8	56	23	15	245	65	48	40	92
Classification	Official..4. Western..2. In general..2.										8	2	1	2	3
Miscellaneous											9				
Express companies, passenger fares, etc.											36				
Grand total											298				

That portion of the recapitulation which pertains to the subjects so far considered shows a total of 245 complaints, which contrasts with a total of 425 for the first fifteen months. The disposition of the complaints during that first period was shown as of April 11, 1908, which was four months and eleven days after the filing of the last complaint included in the tabulations. The disposition shown in the tables included in the summary is that disclosed by the records on June 24, 1909. As this was less than three months after the filing of the last complaint for the period of the survey, which terminated on March 31, a comparison of the disposition of complaints as shown by the recapitulations for the two different periods is not of a great deal of value simply as a comparison. It may have a certain interest, however, as showing the drift of the disposition. At the date of the completion of the survey for the first period 20 per cent. of the complaints had been decided in favor of the complainant; at the date of survey for the second period, 26 per cent. As the date of survey for the first period, 27 per cent. of the complaints had been dismissed, withdrawn or indefinitely postponed; at the date of survey for the second period, 20 per cent. For the first period, 10 per cent. of the complaints had been adjusted or compromised and withdrawn; for the second period, 16 per cent. For the first period 43 per cent. of the complaints had not been decided; for the second period, but 38 per cent. This would indicate that the commission at this time is more nearly abreast of its work, by five points, after an interval of 85 days, than it was at the time of the first survey after an interval of 162 days; with, however, a total number of complaints less by 40 per cent. to consider.

Among the miscellaneous complaints is one of a packing company of the far Northwest, stating that on a shipment of tin cans in a new refrigerator car from St. Louis, they were charged not only the tariff rate on tin cars, but $90 for the movement of the new car. They subsequently filed a complaint, asking not only to be relieved of the charge for the movement of the car but that they be granted mileage because of the service they rendered to the carriers. This packing company is a very frequent complainant. It insisted upon the prompt shipment of two carloads of cattle from a mountainous district of the Northwest for connection with a through train on a particular day. Over the branch line leading from that district the railway had freight service but three times a week, on Tuesday, Thursday and Saturday. The shipment in question, to make the desired connection, had to be made on Wednesday. The railway company states that its agent advised the representative of the packing company that a charge of $10 per car, or $20, would be made for the special service, or, in case such expeditious movement of a shipment is desired at some future time, to decline to make it.

The cases of complaint as to passenger rates include the case of five bishops of the African Episcopal Church, who allege that colored passengers in the southeastern states are not furnished with accommodations equal to those provided for white people. After an exhaustive investigation the commission held that undue discrimination or prejudice had not been shown, and dismissed the complaint.

The Northern Pacific Railway and the Union Pacific lines were ordered to join in the sale of through passenger tickets between Seattle and other points in the Northwest and eastern destinations via Portland, Ore. The Northern Pacific had declined to join in such a through route, on the ground that it wanted, and was entitled to, the long haul on traffic between Seattle and its eastern terminus. It appealed the case and it is now before the Supreme court.

(To be continued.)

TESTING AND CARE OF WIRES.*

BY V. T. KISSINGER,

Assistant Superintendent of Telegraph of Chicago, Burlington & Quincy.

In testing telegraph wires, some wire chiefs ask the way stations to come in on the circuit and try them there. No one should be called into the wire, but the wire chief should call on the local office to pull out the east or west plug to open such wire as may be grounded or crossed, or to ground east or west, such as may be open, and when the trouble is apparently located between two stations an east and west test should be made in the board of each of those stations, which will show if the trouble is or is not in the offices. Many such tests show office trouble that may be cleared by the operator. In locating an ordinary case of trouble, a good wire chief will not call in any office more than once.

The practice of having the operator remove wires from the posts in the switchboard is not to be recommended, and usually brings about trouble at some later day that is hard to explain. These general rules apply to all testing, and a familiarity with the local conditions is of much value. Trouble being located and referred to the lineman, the trouble should be "felt for" hourly, or as often as practicable, and when it is figured out about what time the lineman should reach and clear his trouble more frequent tests should be

*From a paper read before the Railway Telegraph Superintendents' at Detroit.

made. When cleared, a message should be sent to the lineman at the stations each side of him to notify of clearance and advise of other trouble; also of any extra trains, which will help him over the road.

The measurement of insulation with the voltmeter, when followed up by having the small escapes removed, has probably resulted in as much benefit as the low-wound relay, but the low-wound relay furnished immediate relief, while in some cases several months would pass before the leaks shown by the voltmeter could be removed. Both should be used. Claims have been made that the insulation figures obtained by use of the voltmeter were not accurate, as compared with bridge measurements. I do not know that any claim has been made that they were accurate, or any reason for a wish that they be nearer than 5 or 10 per cent. The method is fast and wires may be measured with several stations within a few minutes, with no lost time by reason of interruption, and if the escapes shown by the voltmeter are removed the working circuit will be improved.

Telephone circuits are cut into the regular telegraph test stations (15 to 25 miles apart) in such a manner that they may be opened for test; local offices between the test stations are connected on to the main circuit by means of test connectors, so they may be removed and replaced without soldering iron. By reason of the telephone being more sensitive, greater attention should be given to secure good connecting joints, clean arresters and high insulation.

While it is true that a good telephone circuit will work satisfactorily through wet weather that would practically drown a telegraph wire, the insulation on the telephone should not be neglected, because poor insulation, if not properly distributed, will cause a noisy line; and metallic circuits being double mileage should receive more attention.

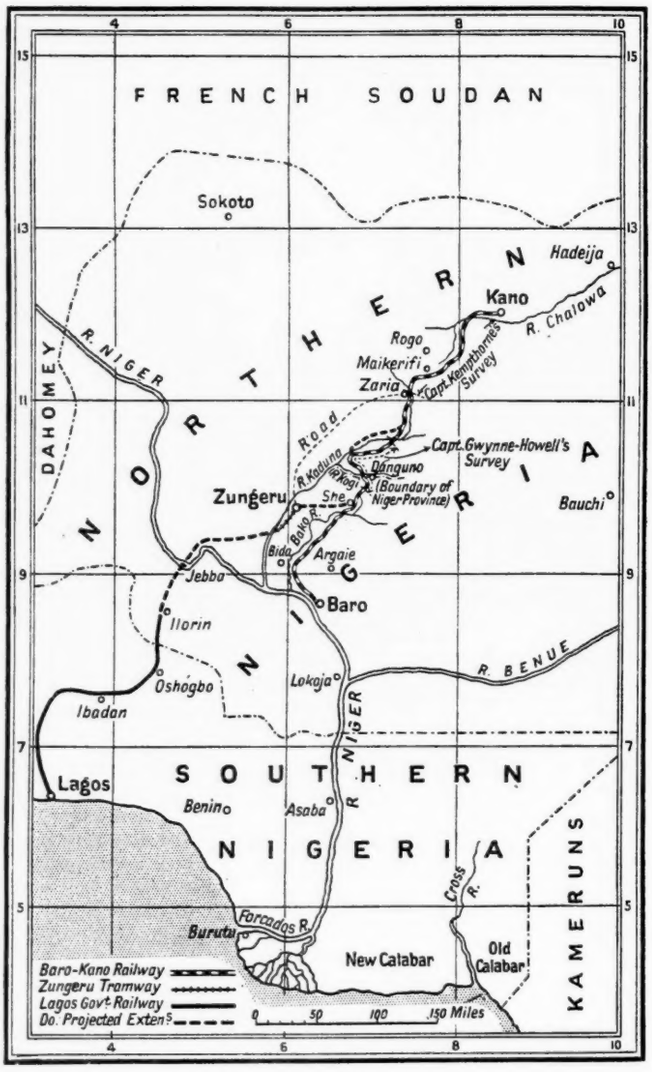
The two sides of the circuit being connected together through the instruments at every station they appear on the testing instruments as one wire and cannot conveniently be measured separately. Copper metallic circuits with 22 stations have been measured through wet snow and rain, showing an insulation resistance of less than one million ohms per mile for 107 miles. Copper and iron wires in commercial telegraph service on the same poles showing about the same insulation per mile of wire were too heavy to be used. The telephone circuits worked all right. The despatcher said "they sound a little different but not much."

In testing for a ground or escape, the two sides of a pair are opened at the test stations the same as with the telegraph, except that the wire chief does nothing but listen to the changes in the noise or watch the voltmeter. When one or both sides are open the test office is asked to short circuit the two sides, which amounts to the same as grounding on a single wire. There seems to be no reason for the use of a ground wire except to locate high resistance joints.

A high resistance may make a noise similar to that made by an escape on one side and may be located by short circuiting and grounding at the same time, which may be done at the test stations until it is located between two test stations. After that the lineman, with a receiver, may be sent out to short circuit and ground the pair while the wire chief listens.

RAILWAYS IN NIGERIA.

The Province of Nigeria, on the west coast of Africa, is divided into the northern and southern districts. The climate of the southern district, which includes the seaport of Lagos, is particularly unhealthy for white people, but northern Nigeria, with an area of 250,000 square miles, is fairly habitable, and is one of the most suitable fields for the development of cotton growing in the British Empire. The population is settled and has attained considerable civilization. The principal difficulty has been one of transport, and for some years there has been a difference in opinion as to the best way of reaching northern Nigeria. One possibility would be to build a railway from the seaport of Lagos north and east to Kano, an old-established town and the center of a civilized government. The other possibility is to use the Niger river as far as Baro or Jebbe and from there to build railways to Kano. As cotton promises to be the principal product of northern Nigeria, the much cheaper cost of transport by water for part of the way from the seacoast to Kana suggests that



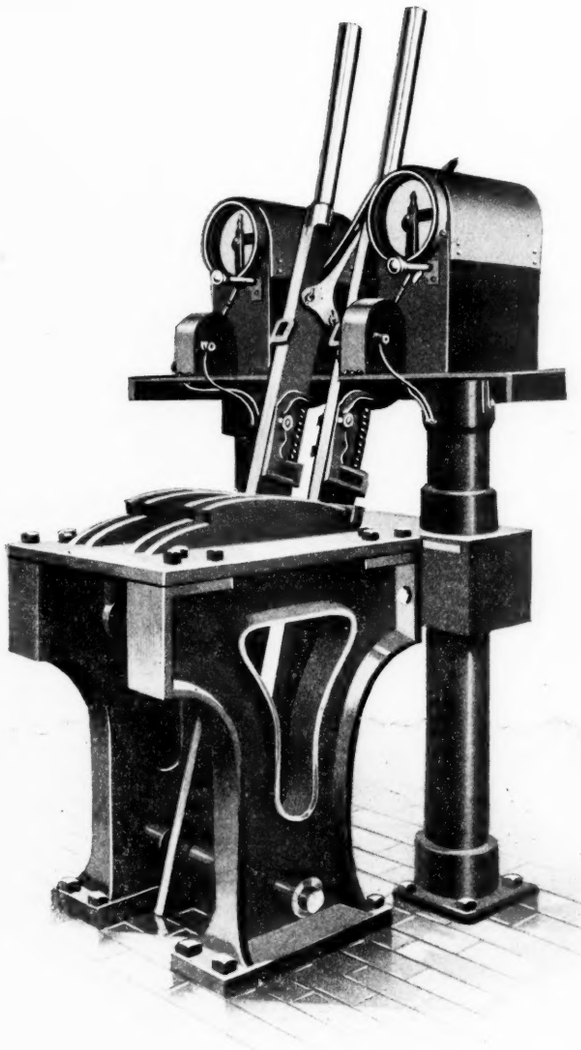
Nigerian Railways.

the proposed railway from Kano to Baro and the transport of goods from there by water down to the Niger river, is the most feasible plan for opening up the northern district.

The Baro-Kano Railway is being built by the government of northern Nigeria. It has a 3 ft. 6 in. gage, and, it is estimated, will cost not more than £3,000 ($15,000) a mile. Labor is fairly plentiful, but the principal cost of building the line has been the extraordinary number of bridges, which had to be much longer than was originally thought because of the great width of the rivers in the rainy season. All of the rolling stock and other material for the railway has been bought from English manufacturers.

The grades on the first section from Baro north 115 miles will vary from 0.7 per cent. to 0.6 per cent., the total rise and fall being 1,750 ft., approximately. North of here steeper grades may be adopted, probably a maximum of 1.7 per cent. Future extensions are planned to extend to tin mines at Bautchi.

THE "INTERSTATE" CONTROLLED MANUAL BLOCK SYSTEM.



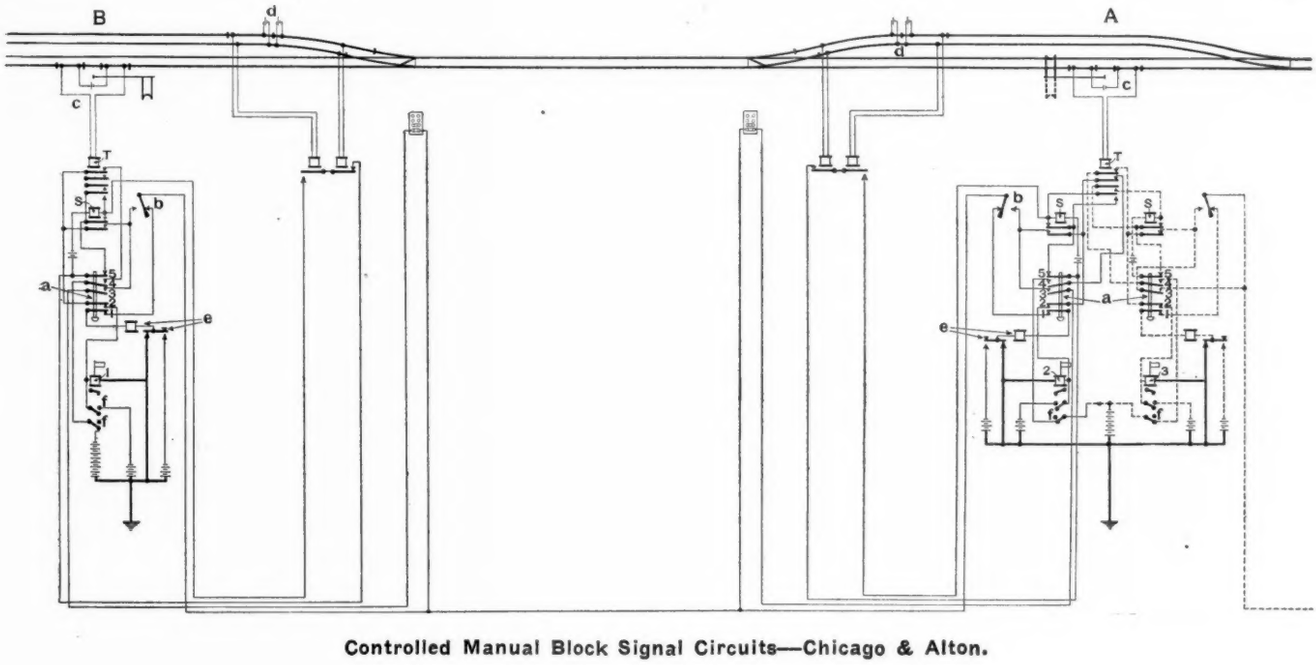
Controlled Manual Block Signal Levers. Interstate Signal Company.

There has been in service for two years or more on the Chicago & Alton between Bloomington and Atlanta, Ill., single track, a simple controlled manual block system. A typical circuit plan is reproduced herewith, also an illustration of a two-lever machine. This machine is connected with the station train order signal and is locked when the signal is in the "stop" position; and all the apparatus is normal and cannot be unlocked, or the signal cleared, until the track is clear to the next block station.

Calling the two stations shown on the circuit plan A and B respectively, suppose that it is desired to move a train through the block from station A to station B. The operator at A calls up the operator at B on the block wire by telegraph, telephone or bell code, and asks him to unlock the machine at A. If the block is not occupied the operator at B can unlock the machine at A by pressing in a plunger a, on his machine, the operator at A throwing his unlock switch b, at the same time. This unlocks the machine at station A, permitting the operator to clear his signal. The plunger a at B works with a spring and the moment the operator releases it, the circuit to a stick relay s, at B, is broken, which prevents him from again unlocking the machine at A for a following train until the train which has left A has passed the insulated track section c at station B. The moment that the train passes B the stick relay s at this station is restored and the operator is again in position to unlock the machine at A. On the other hand the operator at A cannot unlock the machine at B to let an opposing train into the block until it is clear, as the unlock circuit in both directions passes through a contact on the stick relay s in each station, which is opened by the return motion of the plunger.

As noted above, the ordinary telegraph block wire is used in communicating between stations by bells, telephones or telegraph (the telegraph key and sounder are shown at e), and the same wire is used for locking and unlocking the machine. The track is not bonded between stations ordinarily, but there is a track circuit c in front of the office, with one dead rail. If an office is closed a part of the day (or night) the block can be extended by the operator.

At meeting points the relays are cleared up by a track connection on the siding at the fouling point d; or the conductor of the train can notify the operator by telephone that



Controlled Manual Block Signal Circuits—Chicago & Alton.

the train is clear of the main track, at the same time throwing a small three-way switch (not shown), which restores the relays to normal and puts the machine in shape for unlocking again if the track is clear. McClintock mercury contact relays are used with this apparatus.

The machine consists essentially of two levers mounted in a frame. The frame also supports two polarized electric locks and indicators combined (1, 2, 3 in the circuit plan), and the plunger apparatus a. The locks carry contacts f, which move with the lock armature. Contact 5 of plunger a opens momentarily on the return stroke of the plunger, thereby de-energizing the stick relay s, as noted above. The apparatus is so arranged that once the operator has begun to move a lever from either extreme position it is necessary to complete the stroke before any other operation can be performed. This guards against carelessness in handling; it also prevents "carrying an unlock." The circuits arranged as shown do not afford protection for a part of a train which has become detached and left in the block.

In the perspective view of the machine and the miniature semaphore shows when the other station has unlocked. The knob immediately beneath the semaphore is the plunger, and the lever, placed diagonally, immediately below the plunger, is the lock switch. The principal wires are run from beneath the floor up inside the iron pillar and are inaccessible to the operator.

The first cost of an installation is low, and the maintenance likewise, one maintainer having been able to take care of the apparatus on a division 130 miles long. The Inter-State Signal Co., Bloomington, Ill., has been formed to make and sell this apparatus. Mr. Freese, president of the company, informs us that where desired the circuits may be so arranged that yard engines or trains having switching to do at a station may pass over the insulated track section in front of the office as often as may be desired without interfering with the locking device.

CANADIAN PACIFIC LOCOMOTIVE BRIDGE LOAD CHART

The chart used by the Rock Island to show what locomotives could be used over certain divisions was described in the *Railroad Age Gazette* of June 18, page 1295. The accompanying table shows a similar chart which has been in use on the Canadian Pacific for the last eight years, revised copies, of course, being issued every month or so. The Rock Island chart gives more detailed information than this one, but does not seem to be quite so convenient. In the Rock Island chart one column is devoted to each strength of bridge, Cooper's locomotive rating being used. Under each rating are the serial numbers, as well as the types, of locomotives that can be used over such bridges. The location of the various classes of bridges are indicated on a map which accompanies the chart. There is a different chart for each general superintendent's district, but each chart also shows on its map connecting lines of other districts over which one district's rolling stock might need to be routed in emergencies. The chart includes the heavier cars as well as locomotives.

The Canadian Pacific chart, as will be noticed, gives in more compact form substantially the same information, except that cars are omitted. It being intended for the guidance of operating men rather than for the records of the engineering department, the Cooper's rating is unnecessary. It is simpler to classify them by divisions and branches instead, and this also makes the map unnecessary. While serial numbers of locomotives would be a convenience, they would make the chart more bulky and the classification alone should be enough.

Canadian Pacific Railway.—*Bridge Load Chart for Eastern Lines.*

N. B.—Only engines marked ● may be run on following sections. Engines marked "a" are specially limited (see notes foot of table). *Class A 1-7, B 1 & 2, J1, T9 and U1 may be run over entire line.* Sections not shown are good for all power except S1 and as noted below N3. *This Chart cancels all others issued previously.*

Section.	B0.	C1.	C2.	D1-2.	D3-5.	D6.	D8.	D9.	D10-11.	E1-2	E3	E4.	E5a.	E5b-g.	F1.	G1-2.	J2.	L1.	L2.	L3-5	M1.	M2a-d M3	M2e-f.	M4.	N3.†	T1.	U2a, b, d.	U3.	U2c, e, f.	U8.	Motor car No. 88.
Atlantic Division:																															
Woodstock and McAdam	●	●	●	●	●	●	..	..	..	●	●	●	..	●	●	..	●	●	●	●	●	..	..	..	..	●	●	..	..	..	●
Woodstock and Aroostook Junction	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Edmundston Branch	..	..	..	●	..	..	..	..	..	●	..	..	..	..	..	..	●	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Aroostook Branch	..	..	..	●	..	..	..	..	..	●	..	..	..	..	..	..	●	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Tobique Branch	●	●	●	●	●	..	..	..	..	●	●	..	..	..	..	..	●	●	..	..	..	..	..	..	..	●	..	..	..	..	●
Gibson Branch	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Houlton Branch	●	●	●	●	●	..	..	..	..	●	●	..	..	..	..	..	●	●	..	..	..	..	..	..	..	●	..	..	..	..	●
Fredericton Branch	●	●	●	●	●	●	..	..	..	●	●	●	..	●	..	..	●	●	..	..	..	..	..	..	..	●	●	..	..	..	●
St. Stephen Branch	●	●	●	●	●	..	..	..	..	●	●	..	..	..	..	..	●	●	..	..	..	..	..	..	..	●	..	..	..	..	●
Milltown Branch	●	●	●	●	●	..	..	..	..	●	●	..	..	..	..	..	●	●	..	..	..	..	..	..	..	●	..	..	..	..	●
Eastern Division:																															
Nomining to St. Martins Junction	●	●	●	●	●	●	..	..	..	●	●	●	..	●	..	..	●	●	..	..	..	..	..	..	..	●	●	..	..	..	●
St. Lim Branch	..	●	..	●	..	..	..	..	..	●	..	..	..	..	..	..	●	..	..	..	..	..	..	..	..	..	..	..	..	..	..
St. Gabriel Branch	..	●	..	●	..	..	..	..	..	●	..	..	..	..	..	..	●	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Piles Branch	●	●	●	●	●	..	..	..	..	●	●	..	..	..	..	..	●	●	..	..	..	..	..	..	..	●	..	..	..	..	●
Stanbridge Branch	..	●	..	●	..	..	..	..	..	●	..	..	..	..	..	..	●	..	..	..	..	..	..	..	..	..	..	..	..	..	..
St. Guillaume Branch	..	●	..	●	..	..	..	..	..	●	..	..	..	..	..	..	●	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Drummondville Branch	..	●	..	●	..	..	..	..	..	●	..	..	..	..	..	..	●	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Berthier Branch	●	●	●	●	●	●	..	●	●	●	●	●	..	●	..	..	●	●	●	●	●	●	..	..	..	●	●	●	●	..	●
Brockville and Smiths Falls	..	●	..	●	..	..	..	..	..	●	..	..	..	..	..	..	●	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Prescott Branch	●	●	●	●	●	a	..	..	..	●	●	a	..	a	a	..	●	●	a	a	a	a	..	..	..	●	a	a	a	..	●
Ottawa to St. Martins Junction	a	●	a	●	a	a	..	..	..	●	a	a	..	a	..	..	●	a	..	..	..	..	..	..	..	●	a	..	..	..	a
Waltham Branch	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Maniwaki Branch	●	●	●	●	●	..	..	..	..	●	●	..	..	..	..	..	●	●	..	..	..	..	..	..	..	●	..	..	..	..	●
Eganville Branch	..	●	..	●	..	..	..	..	..	●	..	..	..	..	..	..	●	..	..	..	..	..	..	..	..	..	..	..	..	..	..
M. & O. Sec: Montreal to Hull	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	..	..	●	●	●	●	..	●
Hull to Ottawa	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	♂	●	●	●	●	●	●	●	..	..	●	●	●	●	..	●*
Windsor St. and Glen Yard	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	♂	●	●	●	●	●	●	●	..	..	●	●	●	●	..	●
St. Maurice Valley Ry.	●	●	●	●	●	●	..	..	..	●	●	●	..	..	..	..	●	●	..	..	..	..	..	..	..	●	●	..	..	..	●
Ontario Division:																															
Teeswater Branch	..	●	..	●	..	..	..	..	..	●	..	..	..	..	..	..	●	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wingham Branch	..	●	..	●	..	..	..	..	..	●	..	..	..	..	..	..	●	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Elora Branch	●	●	●	●	●	●	..	..	..	●	●	●	..	●	●	..	●	●	●	..	..	..	..	..	..	●	●	●	●	..	●
Lake Superior Division:																															
Temiskaming Branch	●	●	●	●	●	..	..	..	..	●	●	..	..	..	..	..	●	●	..	..	..	..	..	..	..	●	..	..	..	..	●
Kipawa Branch	●	●	●	●	●	..	..	..	..	●	●	..	..	..	..	..	●	●	..	..	..	..	..	..	..	●	..	..	..	..	●

*Prince of Wales Bridge.
† N3—Ottawa (Union station) to North Bay, North Toronto Bch. Guelph to G'd'ch.
a Kempville Junction to Prescott ONLY.
s St. Martins Junction to St. Therese ONLY.
♂ Must not exceed 15 miles per hour.

Note.—The following N. Y. C. engines may be run between Windsor Sta. and Adirondack Junction: B3a, B6, C, C B, C2a, C12, C23, E, E1a, E1c, G, G3, G7, G9, H3, I.

Rutland R.R. engine F2 may run from Windsor St. station to Iberville, but must not exceed 15 m. p. hr., between Windsor St. station and Glen Yard.

The following M. C. R.R. engines may be run between Walkerville Junction and Windsor slip dock: I-80, K-80, F-84, G-2, G-80-D, G-80-E, and G-80-F.

General News Section.

At Norfolk one day last week the German steamer "Adelheid," taking on coal for fuel, at the dock of the Virginian Railway, was loaded with 286 tons in one hour.

The Erie Railroad has restored, beginning with July 1, the wages of all employees who suffered reductions a year and a half ago on account of the business depression.

The New York Air Brake Co. has had 80 freight cars of the Erie Railroad equipped with its K-4 triple valve, and these cars, with an engine equipped with L-1 equipment, are being put through a series of tests on the line of the Erie between Buffalo and Attica.

The directors of the Kansas City Terminal Railway have accepted the ordinance passed by the Kansas City council on June 7 providing for the erection of a new union station. The ordinance now will be submitted to the voters of the city for ratification at a special election.

The Canadian Railway Commission has issued an order requiring every railway in Canada to have the whole of its right-of-way fenced by January 1, 1911. Fences are to be of a minimum height of 4 ft. 6 in., with gates at every farm crossing. At every level crossing there must be adequate cattle guards.

The bulletin issued by the New York State Public Service Commission, second district, showing the punctuality of passenger trains in the month of May, shows 94 per cent. of the trains on time, the highest percentage yet reported during the 14 months that the statistics have been compiled. In March and April the percentage was 92.

To cope with the heavy traffic on some of the surface street car lines in Philadelphia, the Philadelphia Rapid Transit Co. is arranging to run trains of two cars each on a number of lines. It is proposed to have a leading car of about 20 tons with four 40-horse-power motors, and a trailer car weighing 12 tons, with one motor, both cars to be fitted with air-brakes. There will be one motorman and two fare conductors.

It is announced in New York City that the reconstruction of the street railway from Bartow, N. Y., on the Harlem river branch of the New York, New Haven & Hartford, to Belden's Point is to be begun early in the autumn. This line is now worked by horses, but it is proposed to build a monorail railway, the design of the American Monorail Co. This line is controlled by the Interborough Rapid Transit Co. It is about three miles long.

Robbers went through two cars of emigrants in a train of the Erie Railroad which started west from Jersey City about midnight of July 23 and robbed the passengers of considerable quantities of valuables, and the robbers escaped from the train when it stopped at Paterson, about 15 miles out. Few, if any, of the passengers could speak English, and it appears that the trainmen knew nothing of the robbery until the train reached Paterson.

Following a strike a few weeks ago on the Huntingdon & Broad Top Railroad, when 88 enginemen, firemen, conductors and brakemen went out, Commissioner Neill, of the National Bureau of Labor, visited Huntingdon and conferred with the officers of the railway company; but he returned to Washington without accomplishing anything. The railway company said that the places of the strikers had been filled, and therefore the company had no use for the commissioner's conciliatory efforts.

A statement has been issued showing the amount of work devolving on the Canadian Railway Commission, which has greatly increased during the fiscal year ending March 31. The applications received for the year numbered 3,479, an increase of 354; filings received 51,913, increase 6,488; orders issued, 2,249, increase 462, and cases heard at public sittings 737, an increase of 446. The placing under the control of the board of express, telegraph and telephone companies has resulted in a great increase in its work in addition to that created by the rapid expansion of the railway systems.

On July 27, S. T. Park, superintendent of motive power of the Chicago & Eastern Illinois, conducted the first public test of his invention, the Ashton locomotive recording dynamometer, with a 3,000-ton coal train on the C. & E. I. at Danville, Ill. Officers of the Wabash, Kansas City Southern, Vandalia, Chicago & North Western, Rock Island and Northwestern Elevated were present. The party was taken from Chicago in the private cars of President Miller and General Manager Jackson, of the C. & E. I. Results of the test and description of device will appear in the *Railroad Age Gazette*. The test was entirely successful.

Professor Henry C. Adams, head of the Bureau of Statistics and Accounts of the Interstate Commerce Commission, has renewed his request to the water carriers to consider the proposal, which was presented last year, to adopt a uniform system of accounts for carriers by water. As a result of the conference called by the commission a year ago last February the American Steamship Association and other associations of boat owners passed resolutions favorable to the adoption, at least tentatively, of uniform classification of earnings and expenses; but it does not appear that much progress has been made, and so Professor Adams is again sending out copies of the proposed classification, with a request that replies with comment on the document be sent to him before September 1.

Ideal Instructions.

An officer of the New York Central Lines once said to a ticket agent who felt that an inquirer at the desk had asked some unnecessary questions: "Give all the help in your power to the public. Map out the inquirer's trip for him—answer any question he asks. If he wants tickets and sleeping-car accommodations, and can't come after them, send them to him. If you can't route him over our line, send out to your competitor and get his tickets for him—this is not the only trip he will ever make." The trainmen have the same kind of instructions. Call at any of our ticket offices or write or telephone about any trip anywhere any time. We are the recipients of the favor—not you.

The foregoing is from an advertisement published in New York City. We feel warranted in saying, unofficially, that the ticket agent at Jerkimer Flats, when engaged at the stock pen in loading a double-deck car of hogs, will be excused from delivering tickets to summer visitors "up town," as well as from responding to telephone requests for a time-table of stage connections at Shuswap, B. C.

The Railways of Alaska.

The aggregate mileage of railways in Alaska is a little over 200 miles, divided among eight lines. The longest is the Alaska Central, projected from Seward, on the Pacific coast, to a point 460 miles inland, near Fairbanks, on the Tanana river. Of this line about 75 miles—from Seward northward—has been constructed. The remainder is to be constructed as rapidly as possible, and a branch to Knik and the coal fields of the Matanuska river is planned.

The Tanana Valley has been operating since 1907 between Chena and Chatinika, 40 miles, and between Junction City and Fairbanks, five miles. The Council City & Solomon River, with a projected line of 100 miles between Penelope Creek and Candle is, at present, operating 35 miles from Penelope Creek to Dickson. The remaining five lines, with an average running road of 12 miles, are distributed, three along the Pacific seaboard and two on the Seward peninsula.

Competent engineers estimate that construction will cost from 75 per cent. to 100 per cent. more in Alaska than in the

western states. Railways are absolutely necessary to the development of the resources of Alaska, for at the cost of the present methods of transportation only the richest deposits of copper and gold can be worked.

With the advent of railways connecting the interior with the coast the mining of coal will become a large industry in Alaska. The present known coal area covers some 12,000 square miles, and though the coal is not uniformly of a high grade, two coal fields. Controller Bay and Matanuska, covering together an area of 120 square miles, are known to contain a high grade of bituminous and a good grade of semi-anthracite coal. Both these fields have become the objective points of railways now under construction. The copper deposits also are well defined in districts lying to the north and south of the Wrangel Mountains and likewise have become objective points. The southern district has been developed sufficiently to indicate a large tonnage to the railway line that reaches it. These two natural deposits, coal and copper together with gold, are the only present promisers of tonnage to the railways; for the forests, except those along the coastal border, are said to be made up of timber of no value for export. Efforts to secure the financial support of the federal government in railway undertakings will be persisted in.—*Wall Street Journal.*

The Hours-of-Rest Law.

Waco, July 23.—A curious condition has arisen under the law governing the runs made by train crews. It appears that the San Antonio & Aransas Pass passenger train from the south has come in late for the past two or three mornings, and yesterday it did not arrive until 4 o'clock in the morning. It was due to leave for the south again at 7, the regular hour for leaving, but owing to the fact that the road uses the same crew in handling the train this was not possible, as the men had not had the required eight hours' rest. The train, therefore, did not leave here until after 1 o'clock yesterday afternoon, greatly inconveniencing many passengers. The same thing, in a somewhat less marked degree, happened the morning before.—*Houston (Tex.) Chronicle.*

New York Canal Contracts.

On July 21 three contracts were awarded for work on the New York State barge canal. On a fourth contract action was postponed because it cannot be awarded without the approval of the Canal Board and State Engineer, as the bid is over 10 per cent. in excess of the State Engineer's estimates. The contracts awarded are: No. 20-A, improving the river and land line of the canal between Little Falls and Mindenville, to Houston Barnard, Rochester, $490,592; No. 20-B, dredging channel in the Mohawk river, between Mindenville and Canajoharie, S. Pearson & Son, Inc., Long Island City, $933,194; No. 20-C, dredging channel in the Mohawk river from Canajoharie to Yosts, American Pipe & Construction Company, Philadelphia, $585,720; No. 23, constructing the canal, land line, from King's Bend to Genesee river, Millard & Lupton Co., Philadelphia, $1,887,036.

English Channel Crossed by Air Ship in Thirty Minutes.

Louis Bleriot, sailing in his monoplane air ship, crossed the English channel from Les Baraques, near Calais, France, to Dover, England, last Sunday morning in something less than 30 minutes, and landed safely in a meadow east of the town of Dover. He started about half-past four. The distance is about 21 miles. Bleriot's speed most of the way was over 45 miles an hour and rose at times to a rate considerably faster than that. He was followed by a torpedo boat of the French navy, but for about 10 minutes in the middle of the channel he was out of sight of both coasts as well as of the vessel. The air ship was kept about 250 feet above the water most of the time. By thus being the first to cross the channel in the air Mr. Bleriot wins a prize of $5,000, which had been offered by the *London Daily Mail.* Hubert Latham and Count Lambert had expected to attempt the flight across the channel on the same day but after sunrise the wind was unfavorable.

The monoplane weighs about 400 lbs. and measures about 28 ft. across the wings. Its motor is 25 h.p. Mr. Bleriot said that the force of the wind hurt his face and eyes badly and that the wind eddies twisted the machine a good deal as he neared the English coast. According to the Paris *Temps*, Blanchard, a Frenchman, crossed the English channel in a balloon in 1785.

On Tuesday, two days after Bleriot's achievement, Hubert Latham, using his monoplane, much larger than Bleriot's, attempted to cross the channel, but fell to the water about two miles short of Dover. The machine floated and the aviator escaped with slight injuries. He said that the failure of his engine was what caused his fall. Latham made considerably higher speed than Bleriot.

At Fort Meyer, Va., last Tuesday, beginning at 6:36 p.m., Orville Wright, with his biplane airship, made the endurance test called for by his contract with the government, and he remained in the air 1 hour, 12 minutes, 36 seconds, thus doing better than the requirement by more than 12 minutes, and breaking the world's record for a flight with a passenger, which was made by Wilbur Wright in France some months ago. Wright's passenger this week was Lieutenant Frank P. Lahm.

The Galveston Storm.

The tropical storm which struck the coast of Texas last week proved conclusively the wisdom of the $3,500,000 expenditure in building the sea-wall and raising the grade of a portion of the city on the gulf side of the island. It is understood that last week's storm was fully as severe as that of 1900, excepting in wind velocity. In 1900 the highest recorded velocity was 84 miles per hour, when the anemometer was carried away, while the highest velocity last week was 69 miles per hour. The water rose to within a few feet of the top of the 17-ft. wall and the surf broke over the top and flooded the city with about a foot of water. There was practically no damage to shipping, nor were the vessels in port even in danger. The bay bridge, the single track, over which all trains pass from the mainland to the island, was slightly damaged by a dredge drifting against the draw, but there were no sections of the bridge carried away, notwithstanding a number of reports to this effect. Traffic was delayed for about 30 hours, up to 1.30 p. m. on July 22. The construction camp, at Virginia Point, of the A. M. Blodgett Construction Co., Kansas City, Mo., contractors for the arch bridge and roadway of the causeway, was not materially affected by the storm. Work on this causeway, which was fully described in the *Railroad Age Gazette* of June 11, 1909, will be started at an early date.

Subway under Sydney Harbor.

The Royal Commission appointed to consider the best way of establishing direct communication between the northern and southern sides of Sydney Harbor, Australia, has recommended the building of a railway subway, a street railway subway and a subway for vehicles at an estimated cost of £753,000 ($3,765,000), £460,000 ($2,300,000) and £502,000 ($2,510,000), respectively.

Southern Railway Agents' Association.

The eleventh annual meeting of the agents of the Southern Railway Company was held at Old Point Comfort July 16 and 17. The president for the ensuing year is W. A. Davis, of Knoxville.

National Association of Railway Agents.

This association held its thirteenth annual convention at Portland, Me., July 16 and 17. After the convention the members went on an excursion to Quebec as guests of the Grand Trunk.

Lake Shore Trains Run Right-Handed.

On the Western division of the Lake Shore & Michigan Southern, which extends from Chicago to Elkhart, 101 miles, trains are now run on the right-hand track, thus reversing the practice of many years' standing. On the other divisions of the road left-hand running still continues; but the switches and signals are being made ready to extend the change throughout the line.

Society of Railway Financial Officers.

Owing to the recent destruction by fire of the Fort William Henry Hotel at Lake George, N. Y., the executive committee announces that the meeting of the Society of Railway Financial Officers will be held at Hotel Champlain, at Bluff Point on Lake Champlain. The meeting begins September 7.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.
AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Scranton, Pa.
AMERICAN ASSOC. OF LOCAL FREIGHT AGENTS' ASS'NS.—G. W. Dennison, Penna. Co., Toledo, Ohio
AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—R. W. Pope, 33 West 39th St., New York; second Friday in month; New York.
AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 24 Park Place, New York.
AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—S. F. Patterson, B. & M., Concord, N. H.; Oct. 19, 1909; Jacksonville, Fla.
AMERICAN RAILWAY ENGINEERING AND MAINT. OF WAY ASSOC.—E. H. Fritch, Monadnock Bldg., Chicago.
AMERICAN RAILWAY INDUSTRIAL ASSOCIATION.—R. E. Wilson, Ry. Exchange, Chicago
AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago.
AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. Edgar Marburg, Univ. of Pa., Philadelphia.
AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., N. Y.; 1st and 3d Wed., except July and August; New York.
AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., N.Y.; 2d Tues. in month; annual, Dec. 7-10; New York.
AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION.—B. V. Swenson, 29 W. 39th St., New York; Oct. 18-22; Denver, Colo.
ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago.
ASSOCIATION OF RAILWAY CLAIM AGENTS.—E. H. Hemus, A., T. & S. F., Topeka, Kan.
ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Wisconsin Central Ry., Chicago.
ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 24 Park Place, New York.
CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tues. in month, except June, July and Aug.; Montreal.
CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod. Montreal, Que.; irregular, usually weekly; Montreal.
CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Libery St., New York; 2d Friday in January, March, May, Sept. and Nov.; Buffalo.
FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Rich., Fred. & Pot. R. R., Richmond, Va.
INTERNATIONAL MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.
INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago.
INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—H. C. Cook, Royal Insurance Bldg., Chicago
IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month; except July and August; Des Moines.
MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago.
NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tues. in month, ex. June, July, Aug. and Sept.; Boston.
NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August; New York.
NORTH-WEST RAILWAY CLUB.—T. W. Flannagan, Soo Line, Minn.; 1st Tues. after 2d Mon., ex. June, July, August; St. Paul and Minn.
RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, Pittsburgh, Pa.; 4th Friday in month; except June, July and August; Pittsburgh.
RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, 12 North Linden St., Bethlehem, Pa.
RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.
ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; Nov., 1909; Washington.
ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug.; St. Louis.
SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Norquist, Chicago; Sept. 7-8; Fort William Henry, Lake George, N. Y.
SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—J. H. O'Donnell, Bogalusa, La.
SOUTHERN AND SOUTHWESTERN RY. CLUB.—A. J. Merrill, Prudential Bldg., Atlanta; 3d Thurs., Jan., April, Aug. and Nov.; Atlanta.
TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R. R.R., East Buffalo, N. Y.; September, 1909; Denver.
WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, 199 Chestnut St.; Winnipeg; 2d Mon., ex. June, July and Aug.; Winnipeg.
WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony Bldg., Chicago; 3d Tuesday each month, except June, July and August; Chicago.
WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, Monadnock Bldg., Chicago; 1st Wednesday, except July and August; Chicago.

Traffic News.

The Virginia Railway has petitioned the Kanawha Circuit Court, West Virginia, for an injunction restraining the state from prosecutng the road for violation of the 2-cent fare law. In view of the sparse population along the line of the road, the company believes that 2 cents will be far too low a rate.

Consul Haeberle, of Manzanillo, reports that the Toyo Kisen Kaisha Steamship Company of Japan has ordered three ships to run from Hongkong and other Oriental ports to Manzanillo and Salina Cruz, Mexico, and to South American ports as far as Valparaiso and Coronel, Chile, returning by the same route.

It is announced that the fast freight of the Delaware, Lackawanna & Western leaving Hoboken in the evening and delivering freight in Buffalo the next forenoon, has had its time shortened, and it is now due in Buffalo at 10 a.m., or in 15 hours 30 minutes from Hoboken, 410 miles. Freight for this train is taken at the New York piers up to 4.30 p.m.

The Hudson & Manhattan on Sunday last began running trains from Church street, New York, to the Lackawanna station in Hoboken. No stops are made at the Erie Railroad station because the accommodations at that place are not ready; and trains are not run beyond the Pennsylvania station, Jersey City, during the rush hours, because a large number of the new cars ordered by the c mpany have not yet arrived, having been delayed by the strike at the works of the Pressed Steel Car Company.

No freight cars are taken on the Black Diamond Express nor on the first or second Empire, but with proper allowances for these and a few other trifling exceptions, the shipper of freight from New York to Buffalo can now have about anything that he may ask for in the way of speed. The schedule of 17 hours, mentioned in our note of two weeks ago, is now looked upon (by shippers) as insufferably slow. The opinions of the railway officers on this point vary according to the intensity of their desire for speed glory. One of the lines has been landing New York freight in Buffalo before the teamsters had their breakfast eaten, or in about 13 hours from tidewater. Articles of dry goods for the Buffalo department stores are thus put on to the counters in time for each purchaser to get the benefit of the extra trading stamps that go with early purchases. Speed glory is the only glory, for all four of the lines are now in the race so that apparently the only result for each line is to retain its former share of the traffic. As trains must be run at 40 miles an hour a good deal of the way this result is gained only at considerable expense, of course.

Revenues and Expenses of Railways.

The following table gives a summary of the monthly reports of railways for May filed with the Interstate Commerce Commission:

Item.	1908 Amount.	1908 Mile of line.	1908 Ratio p. ct.	1909 Amount.	1909 Mile of line.	1909 Ratio p. ct.
Rail operations:						
Freight revenue. ..	$97,393,189	$566	66	$115,545,539	$663	69
Pass'ger revenue..	36,209,302	210	24	38,707,421	222	23
Other transp. rev..	10,865,131	63	7	11,424,691	65	6
Non-transport. rev.	1,281,716	7	..	1,374,189	7	..
Total oper. revs.	$145,749,340	$847	100	$167,051,842	$959	100
Maint. way & strs.	$21,220,880	$123	14	$24,149,565	$138	14
Maint. of equipmt.	20,565,553	119	14	24,477,528	140	14
Traffic expenses...	3,121,867	18	2	3,508,292	20	2
Transp. expenses..	53,648,444	312	36	55,089,240	316	32
General expenses..	4,002,063	23	2	4,056,554	23	2
Unclassified exp...	35,975	..	..	.....	..	..
Total op. exp...	$102,594,785	$596	70	$111,281,180	$639	66
Net oper. rev...	$43,154,554	$251	29	$55,770,661	$320	33
Outside operations:						
Total revenues....	$2,369,381	$13	..	$3,909,194	$22	..
Total expenses....	2,114,908	12	..	3,862,332	22	..
Net revenue	$254,473	$1	..	$46,862	..	..
Total net rev....	$43,409,028	$252	..	$55,817,523	$320	..
½ annual taxes.....	5,940,756	34	..	6,166,986	35	..
Operating income.	$37,468,271	$217	..	$49,650,537	$285	..
No. of reports	198			200		
Mileage operated ...	171,907			174,107		

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF MAY, 1909.
(See also issue of May 9, 16, and 23.)

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenues (or deficit).	Outside operations. net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Alabama & Vicksburg	143	$70,670	$33,100	$113,010	$17,134	$24,830	$3,392	$41,600	$5,037	$91,993	$21,017	....	$4,000	$17,017	$7,387
Bessemer & Lake Erie	201	593,260	22,221	621,553	47,407	90,558	7,125	141,515	6,490	293,095	328,458	....	6,000	322,458	334,109
Central New England	294	192,931	25,547	233,043	53,699	23,312	1,687	77,414	2,744	158,856	74,187	....	5,600	68,587	30,232
Charleston & Western Carolina	339	77,074	22,838	106,465	25,269	13,713	2,811	39,072	3,582	84,447	22,018	....	6,350	15,668	11,371
Chicago, Peoria & St. Louis	255	89,275	24,586	120,745	14,725	25,213	6,357	57,960	4,827	109,082	11,663	....	3,650	8,013	17,092
Cincinnati Northern	248	60,280	13,781	78,566	19,711	20,980	2,652	28,323	2,750	74,416	4,150	....	4,100	50	‡10,478
Cleveland, Akron & Columbus	210	121,993	36,875	173,007	22,525	31,844	2,752	54,878	3,063	115,062	57,945	....	5,000	52,945	17,608
Cleveland, Lorain & Wheeling	194	377,256	17,231	411,484	33,605	60,651	6,495	105,514	6,332	212,597	198,887	....	9,406	189,481	104,701
Colorado Midland	337	127,470	29,390	194,090	33,253	34,218	10,258	79,952	5,403	163,084	31,006	$728*	7,650	22,628	‡4,062
Cumberland Valley.	162	140,739	44,505	195,140	29,645	16,863	3,498	59,389	4,721	114,116	81,024	239	3,713	77,550	14,588
Duluth & Iron Range	168	699,281	17,841	723,873	79,778	48,984	366	115,568	8,110	252,806	471,067	4,067	29,147	445,987	455,467
Duluth, South Shore & Atlantic	593	151,780	80,967	246,847	49,021	28,196	7,346	84,952	7,552	177,067	69,780	962*	16,000	52,818	40,503
Elgin, Joliet & Eastern	239	219,032	9	224,613	24,960	34,055	3,491	68,109	7,651	138,266	86,347	....	10,500	75,847	36,378
Fort Worth & Rio Grande	196	48,833	24,124	78,462	9,746	5,742	3,423	34,736	4,572	58,219	20,243	....	1,900	18,343	20,312
Georgia Southern & Florida	395	96,192	45,903	165,314	20,031	25,776	5,609	66,124	8,438	125,978	39,336	1,642	8,058	32,920	22,905
Grand Trunk Western	336	280,221	130,337	443,102	39,321	48,531	22,575	175,810	9,929	296,166	146,936	1,156*	28,671	117,109	101,991
Gulf & Ship Island	307	110,545	30,205	150,525	28,313	21,872	1,253	49,746	6,419	107,603	42,922	....	6,852	36,070	39,275
Houston, East & West Texas	191	76,106	26,093	107,974	21,427	8,527	1,230	32,127	3,193	66,504	41,470	....	4,808	36,662	18,196
Kanawha & Michigan	177	146,564	24,877	175,835	54,092	47,938	2,646	54,311	2,834	161,821	14,014	192	7,402	6,804	‡8,781
Louisiana & Arkansas	226	81,623	12,956	98,580	15,445	18,662	1,471	22,150	4,305	62,033	36,547	....	2,013	34,534	5,040
Louisiana Western	198	91,651	46,078	144,662	14,885	19,439	5,478	42,412	6,803	89,017	55,645	698	5,000	51,343	4,561
Mobile, Jackson & Kansas City	403	86,571	23,864	120,421	19,777	12,237	2,143	37,555	8,512	80,224	40,197	....	3,344	36,853	17,734
New Orleans & North Eastern	196	183,065	44,625	248,068	28,132	40,894	8,073	86,547	9,377	173,023	75,045	....	8,000	67,045	32,123
New York, Philadelphia & Norfolk	112	224,052	28,089	270,611	22,574	45,423	3,282	104,901	8,955	185,135	85,476	....	6,250	79,226	16,890
New York, Susquehanna & Western	151	129,091	53,534	208,532	24,696	24,617	2,121	78,536	4,401	134,371	74,161	412*	13,412	60,327	‡30,269
Pittsburgh & Lake Erie	191	952,709	100,572	1,088,687	122,918	100,168	12,861	225,898	18,643	480,488	608,199	641*	17,000	590,558	372,831
St. Joseph & Grand Island	319	76,790	29,141	114,240	40,228	15,376	7,094	41,627	4,304	108,629	5,611	960	5,142	1,429	‡41,482
St. Louis, Brownsville & Mexico	454	85,963	41,605	134,346	17,712	10,540	3,526	44,238	6,210	82,226	52,120	6	4,000	48,126	30,235
Santa Fe, Prescott & Phoenix	257	78,777	32,836	118,926	18,449	7,612	2,502	27,413	5,054	61,030	57,896	....	....	57,896	21,524
Southern Indiana	236	86,643	14,013	102,775	16,006	9,579	1,820	25,591	5,953	58,949	43,826	....	6,928	36,898	29,588
Spokane, Portland & Seattle	420	142,198	40,754	190,454	34,684	13,288	2,911	67,681	4,778	123,342	67,112	253	8,583	58,782	39,568
Stephenville, North'n & South'n Texas	43	3,987	1,296	5,617	553	1,082	275	3,000	515	5,425	192	....	91	101	....
Texas Central	268	34,088	27,697	67,682	33,532	17,288	1,318	40,791	4,235	97,164	29,482*	....	2,945	32,427†	4,082
Vicksburg, Shreveport & Pacific	171	63,364	35,804	108,044	14,282	21,165	3,338	37,139	4,057	79,981	28,063	....	6,200	21,863	30,669
Virginian	443	75,661	12,760	95,686	18,973	13,521	3,692	33,183	7,533	76,902	18,784	....	7,000	11,784	15,788
Western Maryland	543	399,885	74,757	496,359	66,734	70,716	7,700	154,590	12,610	312,350	184,009	....	16,500	167,509	28,535
ELEVEN MONTHS OF FISCAL YEAR.															
Alabama & Vicksburg	143	$918,844	$397,918	$1,421,600	$232,023	$299,508	$37,074	$473,586	$55,486	$1,097,677	$323,923	....	$46,070	$277,853	$21,816
Bessemer & Lake Erie	201	4,940,298	271,496	5,270,777	537,519	1,025,590	71,673	1,448,360	92,850	3,175,992	2,094,785	....	85,000	2,009,785	239,721
Central New England	294	1,891,994	298,594	2,326,984	366,726	227,770	20,340	789,910	32,661	1,437,407	889,577	....	61,600	827,977	455,451
Charleston & Western Carolina	339	986,445	245,446	1,310,522	258,889	154,805	27,647	474,877	39,998	956,216	354,306	....	47,351	306,955	82,936
Chicago, Peoria & St. Louis	255	1,088,104	292,998	1,452,262	199,347	325,616	67,563	630,883	52,307	1,275,716	176,546	....	47,650	128,896	56,211
Cincinnati Northern	248	795,782	180,660	1,025,346	201,118	261,187	29,437	359,944	27,397	879,083	146,263	....	43,317	102,946	38,953
Cleveland, Akron & Columbus	210	1,247,938	401,265	1,797,645	223,230	335,155	24,867	584,530	33,082	1,200,864	596,781	....	65,222	531,559	75,527
Cleveland, Lorain & Wheeling	194	3,002,426	202,594	3,388,031	364,486	596,953	67,364	1,126,887	66,480	2,222,170	1,165,861	....	103,470	1,062,391	‡15,332
Colorado Midland	337	1,498,040	332,660	2,123,740	281,932	315,650	108,836	903,150	64,456	1,674,024	449,716	4,531*	83,199	361,986	‡10,419
Cumberland Valley.	162	1,639,364	509,975	2,260,274	233,232	214,116	41,686	706,360	59,119	1,254,513	1,005,761	4,973	40,842	969,892	29,898
Duluth & Iron Range	168	5,514,251	208,355	5,798,886	697,646	489,291	4,462	1,036,097	105,592	2,333,088	3,465,798	3,227	235,067	3,233,958	283,135
Duluth, South Shore & Atlantic	593	1,468,488	825,558	2,449,854	382,568	295,630	92,112	932,191	72,149	1,774,650	675,204	5,833	181,783	499,254	‡13,068
Elgin, Joliet & Eastern	239	2,228,377	484	2,297,010	233,677	358,368	29,754	739,554	83,462	1,444,815	852,195	....	107,500	744,695	50,649
Fort Worth & Rio Grande	196	731,747	310,133	1,104,566	132,561	95,892	32,000	386,940	50,932	698,325	406,241	....	13,771	392,470	338,777
Georgia Southern & Florida	395	1,056,680	554,188	1,834,787	168,420	302,641	56,913	694,754	93,432	1,316,160	518,627	16,570	90,609	444,588	214,890
Grand Trunk Western	336	3,266,759	1,518,576	5,101,421	417,840	686,893	226,694	1,983,534	124,079	3,439,040	1,662,381	11,489*	348,671	1,302,220	499,376
Gulf & Ship Island	307	1,302,466	323,579	1,732,805	364,922	259,484	14,479	569,086	78,215	1,286,186	446,619	....	54,364	392,255	50,162
Houston, East & West Texas	191	797,779	261,598	1,121,060	203,505	99,576	14,365	367,263	35,291	720,000	401,060	....	40,100	360,960	102,387
Kanawha & Michigan	177	1,636,371	288,100	1,971,720	400,933	519,834	26,439	611,980	30,656	1,589,842	381,878	132	73,543	308,467	206,595
Louisiana & Arkansas	226	903,784	142,479	1,093,989	192,927	201,957	17,661	289,193	47,600	749,338	344,651	....	17,821	326,830	18,000
Louisiana Western	198	1,195,624	506,258	1,790,357	167,991	214,762	54,455	485,777	74,037	997,022	793,335	7,013	55,727	744,621	49,590
Mobile, Jackson & Kansas City	403	1,047,012	280,855	1,424,014	224,170	163,189	18,964	443,661	98,504	948,488	475,526	....	37,255	438,271	213,729
New Orleans & North Eastern	196	2,099,660	509,427	2,803,888	281,063	498,014	83,625	950,395	112,982	1,926,079	877,809	....	86,000	791,809	188,450
New York, Philadelphia & Norfolk	112	2,079,689	348,431	2,603,432	237,875	469,345	33,907	968,736	112,194	1,822,057	781,375	....	68,540	712,835	‡26,169
New York, Susquehanna & Western	151	1,528,605	544,457	2,340,606	231,042	242,842	16,737	845,431	45,574	1,381,626	958,981	4,344*	133,261	821,375	150,515
Pittsburgh & Lake Erie	191	9,362,379	1,092,753	10,797,641	1,298,628	1,114,106	144,800	2,557,423	226,209	5,341,166	5,456,475	4,003*	182,526	5,269,946	‡97,767
St. Joseph & Grand Island	319	997,003	348,018	1,456,773	262,236	162,322	59,378	499,130	41,278	1,024,344	432,429	3,325	46,790	388,964	‡157,684
St. Louis, Brownsville & Mexico	454	752,855	367,656	1,194,671	191,617	139,162	33,352	424,039	61,513	849,683	344,988	624	47,361	298,251	90,257
Santa Fe, Prescott & Phoenix	257	848,560	304,950	1,229,274	199,362	93,188	32,574	286,346	56,144	667,614	561,660	....	....	561,660	19,928
Southern Indiana	236	918,590	146,846	1,090,567	143,142	170,035	18,511	309,116	68,456	709,260	381,307	....	76,213	205,094	‡140,770
Spokane, Portland & Seattle	420	673,783	222,927	934,515	159,597	71,803	17,329	363,003	34,809	646,541	287,974	2,395*	95,675	189,904	179,546
Stephenville, North'n & South'n Texas	43	78,116	16,474	98,378	7,526	10,453	2,060	27,050	6,460	53,549	44,829	....	1,200	43,629	....
Texas Central	268	661,859	364,160	1,098,743	200,029	164,409	12,541	393,330	48,862	819,171	279,572	....	28,142	251,430	56,209
Vicksburg, Shreveport & Pacific	171	744,616	425,399	1,266,794	220,720	250,659	36,466	403,729	46,864	958,438	308,356	....	66,652	241,704	93,627
Virginian	443	353,672	81,975	473,514	102,918	76,754	22,532	165,254	34,579	402,031	71,477	75	24,600	46,952	95,743
Western Maryland	543	4,466,619	743,683	5,456,249	607,305	800,730	77,320	1,764,152	134,735	3,384,242	2,072,007	....	181,500	1,890,507	150,552

*Deficit. †Loss. ‡Decrease.

New Rates on Import Traffic.

Announcement is made at Philadelphia by the Pennsylvania, the Reading and the Baltimore & Ohio that on September 1 they will put into effect new rates on import traffic from New York, Philadelphia and Baltimore to Central Freight Association territory and to St. Paul-Minneapolis group points, on classes and commodities, and to Missouri river points on commodities. This means a further reduction from the rates recently announced by the Boston & Maine from Boston. The new rates on classes will be on the basis of 66 cents, first class, from New York, 60 cents from Philadelphia and 58 cents from Baltimore to Central Freight Association territory. This makes the first-class rate from Philadelphia one cent per 100 lbs., less than the Boston & Maine rate, and places that rate on the same relative basis which existed before the present cutting began.

It is announced in Boston that the Boston & Maine will at once meet the last reductions made on import freight westward from Philadelphia, and that all subsequent cuts will be followed in the same way.

New Grain Rates to Favor Chicago.

Western and southern roads have agreed to a readjustment of freight rates on grain moving through Chicago, which will remove disadvantages as compared with St. Louis and other grain markets which have existed for 20 years. It is announced that tariffs are to be made effective about October 1 which will equalize the grain rates from all points in Iowa, North and South Dakota, Minnesota and Nebraska to the Southeast, so that the grain may be moved through Chicago at rates equal to those through other gateways. It is expected that this will mean an annual increase in Chicago's grain business of 20,000 carloads.

New grain rates applying south of the Ohio river from Cincinnati and Louisville will also be established at the same time. These will be flat rates, 2 cents per 100 lbs. less than through other Ohio river crossings, the difference being made to compensate for a 2 cent shrinkage allowance, so that all gateways will be on a parity, whether the grain is shipped from Chicago or St. Louis.

INTERSTATE COMMERCE COMMISSION.

Section 2 of the act precludes the allowance of commutation rates to school children unless the same rates are open to all children within the age limit. Former administration ruling on this question affirmed. (17 I. C. C. Rep., 144.)

Again the commission adheres to its former ruling in a proceeding entitled *In the Matter of Through Routes and Through Rates*, 12 I. C. C. Rep., 163, that whenever by any transit arrangement through rates are applied, such through rates must be as of the date corresponding to the first movement of the shipment from the point of origin under such through rates.

Where a transportation service has been rendered for which no tariff authority whatever exists and where the shipper has paid the sum claimed by the carrier for that service, the commission has jurisdiction to inquire what was a reasonable charge for the service and to order the repayment of whatever the carrier has collected over and above such reasonable charge. (17 I. C. C. Rep., 90.)

The commission has ordered that the accounts, etc., in the list of accounts, records and memoranda prepared under the direction of Henry C. Adams, in charge of statistics and accounts, be retained permanently by carriers, or be retained for the time designated against each item in the list. The commission further specifies the way in which accounts that it is proper to destroy shall be destroyed. The order became effective July 1. This is the formal order amplifying and giving in detail the regulations issued by the commission in regard to the preservation of accounts last year.

Minimum Carloads on Furniture.

W. W. Montague & Co. v. Atchison, Topeka & Santa Fe et al. Opinion by Commissioner Prouty.

A carload minimum for light and bulky articles like furniture should be such that the minimum can ordinarily be loaded, but the minimum is not necessarily unreasonable because it occasionally happens that cars, although loaded to their full physical capacity, will not contain it. Minimums fixed by transcontinental tariffs on wood mantels and brass bedsteads condemned as too high. Reparation awarded.

Rates to the Saginaw Valley Not Unfair.

Saginaw Board of Trade et al. v. Grand Trunk. Opinion by Commissioner Harlan.

The percentage of the Chicago rates, adopted by defendants as a basis for fixing the rates from Atlantic coast territory to Saginaw, Mich., Flint and other points in the Saginaw valley, is not found to be too high, when compared with the percentages that fix the rates enjoyed by other groups in adjacent territory. The proximity of Detroit and Toledo to the great channels of through transportation and their location on direct through routes where the density of traffic is very great and the general operating and traffic conditions are favorable, are elements that cannot be ignored by the rate maker and must necessarily tend to fix lower rates than can be accorded to communities that are removed from these great streams of traffic.

COURT NEWS.

In the federal court at Wilmington, N. C., the United States government has sued the Atlantic Coast Line for $10,000 damages, growing out of the wreck of a mail car on that road in 1904, when some valuable registered mail was lost. The defense claims that the railway is not liable for mail in transit, and, moreover, that the government itself is not liable to anyone for the loss.

The Supreme Court of Connecticut, in an opinion by Chief Justice Baldwin, decides that the employers' liability act, passed by Congress in 1908, is unconstitutional, and it is furthermore stated that even if the act is constitutional, action should be instituted in the federal and not in the state courts. The opinion was in the cases of Hoxie and Mondow, brakemen, against the New Haven road for injuries received while employed in that capacity, in an accident resulting from the negligence of a fellow employee. Hoxie claimed damages under the liabilities act, which under certain limitations makes a common carrier responsible for injuries received by employees as the result of negligence or carelessness of a fellow worker. The attorney for the road asserted that the act was unconstitutional and was upheld by Judge Wheeler and the matter was taken to the Supreme Court of Errors. A representative of Attorney-General Wickersham was in court to set forth the government's side of the case.

Three test cases of employers and carriers' liability which have been decided adversely to the railways in Texas are to be brought before the Supreme Court of the United States. Motions for a writ of error have been filed with the court in Washington. In one of the cases M. E. Pickens got judgment against the Atchison, Topeka & Santa Fe for $7,500 for personal injuries which he received while a brakeman in the employ of the company. In the other two cases the Galveston, Harrisburg & San Antonio is the defendant. In these cases J. D. Crow and L. V. Wallace secured judgment against the railway for a total of about $700 in two suits for alleged damage to certain shipments of wool made by them from Uvalde to the Mohair Plush Company, of Lowell, Mass. The railway company sought to prove that the shipments were carried by it in good condition, were turned over by it to the next connecting road in good condition, and that the damage or loss, if any, was at the Lowell end of the line, where the railway company could not be held responsible for it.

Railroad Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Harrison Nesbit has been elected the president of the New Mexico Central, with office at Santa Fe, N. Mex., and Francis J. Torrance, treasurer, has been elected the secretary. Charles C. Murray succeeds Mr. Torrance. E. R. Paul has been appointed the acting auditor, with office at Santa Fe.

O. H. Nance, treasurer of the Trinity & Brazos Valley, has been elected the auditor and treasurer of the St. Louis, Brownsville & Mexico, succeeding as treasurer J. D. Finnegan, who has been the secretary and treasurer and retains his office as secretary. See item under Operating Officers.

Scott M. Rogers, whose election as vice-president of the Elgin, Joliet & Eastern, with office at Chicago, has been announced in these columns, was born in 1871 in England. He received a common school education and began railway work in 1888 as clerk and stenographer to the general manager and purchasing agent of the Iowa Central. In 1893 he was made chief clerk to the general manager, and in 1894 became purchasing agent. He held that position and was also assistant to the general manager until 1900. In 1901 he was appointed chief clerk to the president of the Elgin, Joliet & Eastern, and in 1902 became purchasing agent and assistant to the president, which position he held until he was elected vice-president a few weeks ago.

Operating Officers.

R. H. Allison has been appointed a trainmaster of the Peoria & Eastern, with office at Indianapolis, Ind., succeeding T. J. Hayes, transferred.

August Syverson, formerly a chief despatcher of the Chicago & North Western, has been appointed a trainmaster at Council Bluffs, Iowa, succeeding C. T. Boone, promoted.

R. O. Cowling, trainmaster of the Washington division of the Oregon Railroad & Navigation Co., has been appointed the assistant superintendent, with office at Starbuck, Wash., and his former office has been abolished.

J. D. Finnegan, secretary and treasurer of the St. Louis, Brownsville & Mexico, has been appointed the superintendent, and will also retain his office as secretary. See item under Executive, Financial and Legal Officers.

A. S. Ingalls, assistant general superintendent of the Lake Shore & Michigan Southern at Cleveland, Ohio, has been appointed the general superintendent of the Chicago, Indiana & Southern, with office at Gibson, Ind., succeeding E. Ryder, deceased.

C. A. Vermillion, formerly on the Missouri Pacific, has been appointed the trainmaster of the Spokane, Portland & Seattle, with office at Vancouver, Wash. J. F. Gannaway, formerly on the Missouri Pacific, has been appointed chief despatcher, with office at Spokane.

W. F. Schaff, trainmaster of the Cleveland division of the Cleveland, Cincinnati, Chicago & St. Louis, has been appointed the assistant superintendent of the Franklin division of the Lake Shore & Michigan Southern, with office at Franklin, Pa. C. W. Buchanan succeeds Mr. Schaff, with office at Cleveland, Ohio.

Traffic Officers.

Frank Cassidy, division freight agent of the Chicago Great Western at Des Moines, Iowa, has had his jurisdiction extended to include Des Moines.

Clayton E. Wood, agent of the International & Great Northern at Tyler, Tex., has been appointed a general agent in charge of both freight and passenger traffic.

L. H. Mann has been appointed a soliciting agent of the Southern Railway, with office at Chicago, succeeding E. F. McKee, resigned to accept service with another company.

A. Wyman, auditor of the Idaho Northern, has been appointed the traffic manager, with office at Enaville, Idaho, succeeding J. A. Walden, resigned to go into other business.

C. G. Blackburn, city ticket agent of the Cincinnati, New Orleans & Texas Pacific at Cincinnati, Ohio, has been appointed a division passenger agent at Cincinnati, succeeding C. W. Zell, deceased.

W. R. Haldane, general freight agent of the Pacific division of the Canadian Pacific at Vancouver, B. C., has resigned on account of ill health. W. C. Bowles, general freight agent of the Central division at Winnipeg, Man., succeeds Mr. Haldane. R. E. Larmour, general freight agent of the Kootenay lines at Nelson, B. C., succeeds Mr. Bowles. R. W. Drew has been appointed the acting general freight agent of the Kootenay and Boundary districts, with office at Nelson, B. C.

G. S. Rains, whose appointment as general freight agent of the Seaboard Air Line, with office at Norfolk, Va., was recently announced in these columns, was born on February 16, 1879, at Gainesville, Fla. He received his education in the public schools and began railway work on December 5, 1893, in the office of the Florida Central & Peninsula at Jacksonville, Fla., finally becoming the chief rate clerk. When that company became part of the Seaboard Air Line in July, 1900, he was transferred to the general freight office of the Seaboard Air Line at Portsmouth, Va., leaving in November, 1901, to go to the Atlantic Coast Line at Savannah, Ga. The following February he returned to the general freight office of the Seaboard Air Line, where he has been consecutively chief rate clerk, assistant chief clerk and chief clerk of rate department, which position he held until his recent appointment as assistant general freight agent.

Engineering and Rolling Stock Officers.

W. A. Hopkins, electrical engineer of the Wabash at Decatur, Ill., has resigned to engage in other business. See item under Supply Trade News.

W. B. Embury, master mechanic of the Oklahoma and Pan Handle divisions of the Chicago, Rock Island & Pacific, with headquarters at Chickasha, Okla., has had his jurisdiction extended to include Sayre Station.

Special Officers.

E. M. Westervelt has been appointed the real estate agent of the Chicago, Burlington & Quincy, with office at Lincoln, Neb., and the office of right-of-way agent is abolished. The real estate department is established, effective August 1, to embrace all matters pertaining to lands belonging to the company.

Purchasing Officers.

F. B. Shimer has been appointed the general store keeper of the Lehigh Coal & Navigation Company, with office at Lansford, Pa.

C. A. How, purchasing agent of the Wabash, has been appointed the supply agent of the Missouri Pacific and the St. Louis, Iron Mountain & Southern, effective August 1.

W. G. Manchester, storekeeper of the Iowa Central at Marshalltown, Iowa, has been appointed purchasing agent Iowa Central and Minneapolis & St. Louis, with office at Minneapolis, Minn.

OBITUARY.

George A. Casseday, bridge engineer of the Great Northern, died July 20 at St. Joseph's hospital, St. Paul, Minn. Many of the important bridge structures of the Great Northern have been designed and erected under his supervision. He had been in the company's service since April, 1895, at which time he became a draftsman in the bridge department, and has been head of that department as bridge engineer since March, 1903.

William Brown, formerly general solicitor of the Chicago & Alton, died at Jacksonville, Ill., on July 25. Mr. Brown was born September 20, 1840, at Booneville, Mo., and was educated at Illinois College and Missouri University. He began railway work in 1872 as local attorney for the Chicago & Alton and the Wabash at Jacksonville. He was attorney for the Wabash for two years and was attorney for the Chicago & Alton until November, 1890, when he was appointed general solicitor, which position he held until a few years ago.

Railroad Construction.

New Incorporations, Surveys, Etc.

ARKANSAS, OKLAHOMA & PARIS.—Incorporated in Arkansas, with $266,000 capital, to build from Morris Ferry, Ark., on the Kansas City Southern at the Little river, west to Paris, Tex., 80 miles. The incorporators include: P. S. Brown, Jr., and W. S. Pryor, of Kansas City, Mo.; A. D. Dulaney, J. M. Johnson and W. E. Kinsworthy, of Ashtown, Ark.

AROOSTOOK VALLEY ELECTRIC.—According to press reports, the Canadian Pacific is back of the Aroostook Valley, organized to build an electric line from Presque Isle, Me., northwest to Washburn, 12 miles, and eventually an extension north to the St. Johns river, 110 miles.

BUFFALO FRONTIER & TERMINAL.—The New York Public Service Commission, Second district, has authorized this company to build a freight belt line for Buffalo, N. Y. A similar application made by the Buffalo Connecting Railway was denied. The names of the projectors are not given.

CANADIAN NORTHERN ONTARIO.—Announcement has been made that a recent issue of stock will provide funds to build a line from Niagara Falls, Ont., northwest to Hamilton, thence northeast via Toronto, Oshawa, Port Hope, Cobourg, Trenton, Belleville and Smiths Falls to Ottawa, where it will join the line building east to Hawkesbury, connecting with the line to Montreal, Que. An entrance into Buffalo, N. Y., is to be secured over an international bridge to be built at Niagara Falls over the Niagara river.

CANADIAN PACIFIC.—See Aroostook Valley Electric.

CHICAGO, MILWAUKEE & ST. PAUL.—According to press reports from Minneapolis, Minn., plans have been made by the Chicago, Milwaukee & St. Paul for the elevation of its tracks in Minneapolis to eliminate the grade crossings. It is expected the cost will be about $6,000,000 and it will require two years to complete the work.

CROSSETT RAILROAD.—Incorporated in Arkansas, with $25,000 capital, to build 10 miles in Ashley county, from Crossett, Ark. The incorporators include: E. W. Gates, St. Louis; A. Trieschman, C. W. Gates, J. C. Norfleet and E. S. Crossett.

DELAWARE, LACKAWANNA & WESTERN.—An officer says that surveys are being made for a 25-mile cut-off north of Scranton, Pa.

DENVER & RIO GRANDE.—An officer writes that second track is to be laid as follows: Between Colton, Utah and Kyune, 5.52 miles, at an estimated cost of $150,000; between Helper and Castle Gate, 4.5 miles, to cost $140,000; between Redcliff, Colo., and Pando, 5.53 miles, to cost $174,000. Other improvement work is being carried out at various places on the road. (June 11, p. 1229.)

EUGENE-SIUSLAU.—According to press reports, surveys will be started soon by Dr. H. B. Leonard, of the University of Oregon, for a line from Eugene, Ore., northwest to Franklin, 18 miles. Construction work is to be begun early in August. It is expected to extend the line next fall west to Florence, at the mouth of the Siuslau river.

GRAND JUNCTION & GRAND VALLEY.—An officer writes that this company, which is building an electric line from Grand Junction, Colo., to Palisade and to Fruita in the Grand River valley, Colorado, has 3½ miles of track laid. The company is doing the work itself.

GRAND TRUNK PACIFIC.—Track laying on the section from Winnipeg, Man., west to Edmonton, Alb., was finished on July 16. The last spike was driven at Cloverbar bridge near Edmonton. Ballasting will be continued as rapidly as possible so as to start regular train service early in the fall. The contract recently let to Foley-Welsh & Stewart was for 180 miles on the section between the McLeod river, Alberta, and Tete Jaune Cache, B. C., at a point 50 miles west of the Yellow Head Pass. (July 16, p. 124.)

GREAT NORTHERN.—On the extension of the Vancouver, Victoria & Eastern to Princeton, B. C., it is expected that track laying will be finished to the second crossing of the Similkameen river by July 31, and to Twenty Mile creek by August 15. A bridge over the creek to connect with the yards at Hedley is to be finished by September 1, and the line put in operation to Princeton by December 1. (March 19, p. 654.)

HANNIBAL & NORTHERN MISSOURI (ELECTRIC).—An officer writes that grading contracts are to be let about October for building this line, projected from Hannibal, Mo., on the Mississippi river, west via Palmyra, Bethel and La Plata to Kirksville, about 100 miles. F. W. Latimer, president, Galesburg, Ill. The Roberts & Abbott Co., Cleveland, Ohio, are the engineers. (July 16, p. 125.)

HORNELL-BATH (ELECTRIC).—Incorporated in New York, with $25,000 capital, to build from Hornell, N. Y., east to Bath, 24 miles. The directors include: C. Adsit, C. H. Armsted and J. M. Finch, of Hornell, and J. F. Turk, of Hammondsport.

INTERNATIONAL & GREAT NORTHERN.—According to press reports, 80-lb. rails are being put in to replace lighter sections, at the rate of a mile a day, from Houston, Tex., north to Spring, about 23 miles. (May 21, p. 1099.)

LITTLE KANAWHA.—According to press reports from Parkersburg, W. Va., this line, which is now being operated by the Baltimore & Ohio for 30 miles in West Virginia, is to be extended from Palestine east to Walkersville, about 70 miles.

MIDLAND VALLEY.—An officer writes that surveys are finished for a branch from a point east of Muskogee, Okla., south to Honey Grove, Fannin county, Tex. Surveys also made via Ambrose, Tex., to Sherman.

MISSOURI, KANSAS & TEXAS.—According to press reports, a contract has been given to the Walsh-Kahl Construction Co. to relocate 12 miles of line between Luther, Okla., and Fallis. The company is elevating its tracks to eliminate the danger from floods.

MOUNTAIN VALLEY & PLAINS.—An officer is quoted as saying that work is to be started at Cimarron, N. Mex., on October 1; at Dalhart, Tex., October 15, and at Guthrie, Okla., November 1. The company was organized to build about 195 miles of line from Higgins, Tex., east to Guthrie, with an extension from Higgins west to coal and timber lands at Cimarron, N. Mex. C. M. Cogan, of Canton, Ohio, and D. W. Herrington, of Dalhart, are interested. (Jan. 22, p. 187.)

NORTH COAST.—According to press reports, this company will build about 700 miles of line as follows: From Spokane, Wash., west via Tacoma to Seattle, 378 miles; from a point on this line south of Tacoma at Portland Junction south to Portland, Ore., 85 miles; from a point on the Spokane-Seattle line at Kiona, east to Walla Walla, 48 miles; north from Walla Walla to Ritzville, on the Spokane-Seattle line, 84 miles; from Ritzville north to Davenport, 45 miles. From Spokane a line is to be built southeast to Tekoa, 41 miles; also one from Kennewick northwest to Priest Rapids, 50 miles. About 100 miles of grading has been finished on these lines. In addition, there are to be a number of branches. The work will include a bridge over the Columbia river near Kennewick, and probably a tunnel at Tieton Pass, also a bridge over Snake river and a bridge near Spokane. R. E. Strahorn, president and manager, Spokane. (May 7, p. 1007.)

NORTHERN PACIFIC.—According to press reports, plans are being made to build from the Columbia river, south through central Oregon, paralleling the proposed line of the Oregon Railroad & Navigation Co. and of the Pacific & Eastern, operating a line from Medford, Ore., northeast into the Cascade mountains.

OREGON RAILROAD & NAVIGATION CO.—An officer is quoted as saying that work is now under way on the first section of 40 miles from Des Chutes, Ore., on the Columbia river, south to Redmond, in the central part of Crook county. The work is expected to be finished in about 18 months. The line is to be extended south to have a total length of 250 miles, of which 80 miles are through a very deep canyon, and will necessitate difficult construction work. Twohy Brothers, contractors, will have charge of the work.

PASCAGOULA & NORTHERN.—Work will probably begin within a week or ten days on a four-mile extension from the northern terminus of this 36-mile line to a connection with the

Mobile, Jackson & Kansas City at Evanston, Miss. (July 16, p. 125.)

Portvue & McKeesport (Electric).—Work, it is said, will be started soon on a line from Portvue, Pa., to McKeesport. The line is eventually to be extended to Clairton, Elizabeth and other towns. J. F. Woodward, president; I. A. Simon, secretary and treasurer; E. W. Pitts and J. W. Jones are directors. Thomas W. White is the engineer in charge.

Quincy & Eastern.—An officer writes that six miles of this line will be in operation about November 1. The line is to run from Hartwell station, Cal., on the Western Pacific, 17 miles. At Quincy it is expected that a large lumber industry will be opened up on the completion of the road. The money for building the road has been raised by stock subscription.

Rome & Northern.—Burke & Joseph, of Cape Girardeau, Mo., who have the general contract to build this line from Rome, Ga., north, are said to have sublet grading work to Hill Brothers, of Memphis, Tenn. W. B. Arnold has a contract for clearing, grading and masonry work, also for some bridges. It is expected to have the line from Rome, north to Gore, 10 miles, finished by November. (July 2, p. 35.)

St. Louis & Houston Mineral Belt.—Incorporated in Missouri, with $400,000 capital, to build a line from Houston, Mo., southwest to Cabool, in Texas county, 20 miles. A. H. Johnson, of Springfield, Mo.; C. Dooley, M. G. Coyle, R. Lamar, E. A. Leavitt and E. K. Lyles, all of Houston, are interested.

St. Louis, Houston & Harrison Mineral Belt.—Organized to build from Salem, Mo., southwest via Houston and Gainesville, to Dodd City, Ark., thence via Clarksville to Paris, Tex. The line is eventually to be continued through Texas via San Antonio to deep water at Aransas Pass, on the Gulf of Mexico. A promoter writes that application has been made for a charter to build a branch from Houston, Mo., northwest and west through the counties of Texas, Laclede, Dallas, Polk and Cedar, to a connection with the Missouri, Kansas & Texas, at Nevada, in Vernon county. Application has also been made for a branch from Houston north through the counties of Texas, Pulaski, Miller and Cole, to Jefferson City. W. A. Squires, Houston, may be addressed.

St. Louis Southwestern of Texas.—An officer writes that no definite plans have as yet been made concerning improvements during the present fiscal year. The general plans under consideration include a station at Texarkana, Tex., and improvements to the terminals at Fort Worth, as well as a large amount of new ballasting.

San Luis Southern.—An officer writes that this company was recently incorporated in Colorado with $1,000,000 capital to build from a connection with the Denver & Rio Grande at Blanca, Costilla county, Colo., to the Costilla river, 33 miles, for which contract has been let. Franklin E. Brooks, president, Colorado Springs; L. D. Blauvelt, general manager and chief engineer, Blanca. (July 16, p. 126.)

Umatilla Railway & Electric Power Co.—Incorporated in Oregon, with $100,000 capital, to build from Pendleton, Ore., south to Dale, in Grant county. Also a loop line northwest from Pendleton to the Columbia river, thence paralleling the river to Umatilla and across the Government Reclamation project, returning to Pendleton; in all, about 200 miles. Much of the engineering work has already been finished. The southern line is being located through Pilot Rock, Nye, Albee and Ukiah towards Grant county. C. J. Smith, of Pendleton, associated with D. Belts and A. R. Turner, are back of the project.

Vancouver, Victoria & Eastern.—See Great Northern.

Virginia, Carolina & Western.—According to press reports, surveys are being made in Virginia over various routes for a line from the James river south to Danville. Financial arrangements are said to be made to build the line as soon as the route is selected. The officers are T. O. Troy, president; W. R. Fitzgerald, vice-president; B. R. Darrison, secretary. The above and Captain H. C. Joyner, of Amherst, Va., and Col. A. B. Carrington, of Danville, are directors.

Youngstown & Ohio River.—This road has been extended from Lisbon, Ohio, southeast to East Liverpool, 19 miles.

Railroad Financial News.

Albany & Hudson.—Raymond H. Smith, general manager, has been appointed receiver, and the following have formed a first mortgage preferred stock and common stockholders protective committee: Myron T. Herrick, C. L. Rossiter, R. A. C. Smith, with I. W. Day, secretary, 100 Broadway, New York. The committee have prepared a plan and reorganization agreement and ask deposit of securities with the Trust Company of America, New York. The Albany & Hudson is a third-rail electric line from Albany, N. Y., to Hudson, 37 miles.

Chicago Great Western.—More than 90 per cent. of the debenture stock, and substantial amounts of other stock, have been deposited under the plan of reorganization, and J. P. Morgan & Co., the reorganization managers, have limited the time for the deposit of securities to August 2, 1909. (June 18, p. 1330.)

Chicago, Lake Shore & Eastern.—The first mortgage securing $20,000,000 sixty-year 4½ per cent. bonds has been filed for record. Of this issue of bonds $9,000,000 were sold to Wm. A. Read & Co., New York, last May, and the remaining $11,000,000 can be issued only on vote of stockholders at a rate not to exceed 50 per cent. of capital expenditures.

Chicago, Peoria & St. Louis.—The reorganization committee has issued a plan for reorganization under which the new company to take over the property is to issue $15,000,000 general and refunding mortgage 30-year 4½ per cent. bonds. Foreclosure of the present consolidated and income mortgages is provided for, and deposits of securities are asked up to September 15.

Delaware & Eastern.—The New York Public Service Commission, Second district, has authorized the company to issue $2,050,000 stock and $4,570,000 first mortgage 5 per cent. bonds of 1907-1957. Of the bonds, $3,500,000 may be sold at par, in accordance with the terms of the underwriting agreement filed with the commission, and the remainder may be sold at not less than 80.

Louisville & Nashville.—The unified mortgage 4 per cent. bonds of 1890-1940, of which there are outstanding $57,874,000, have been made a legal investment for savings institutions of Massachusetts. The Massachusetts law is particularly rigid in its requirements, making it necessary, among other things, that before bonds can be a legal investment for savings banks, the company issuing them must have paid matured principal and interest on all its mortgage indebtedness, and have paid cash dividends of at least 4 per cent. on all its outstanding stock for the 10 years preceding the date of investment.

Mexico Northwestern.—This company, which some months ago acquired control of the Chihuahua & Pacific and the Sierra Madre & Pacific, has now bought control of the Rio Grande, Sierra Madre & Pacific as well. The three companies have mileage in northwestern Mexico as follows: Chihuahua & Pacific, 175 miles; Sierra Madre & Pacific, 32 miles, and the Rio Grande, Sierra Madre & Pacific, 160 miles, the latter running from El Paso, Tex., to Casas Grandes, Mex.

Missouri Pacific.—The lease of the Booneville, St. Louis & Southern is to be extended for 99 years, and the $400,000 outstanding bonds are to be redeemed in 1911 and a new issue of bonds is to be sold.

Southern Indiana.—The federal court has directed the receiver to deposit the money to pay the interest installments due August 1, 1908, on the first mortgage 4 per cent. bonds, and on August 2, 1909, bondholders who deposit their bonds with the Bankers Trust Co., New York, will receive $21.20 per bond. It is intended to pay one semi-annual interest coupon each six months until reorganization. If this plan is carried out the reorganization will only have to provide for two defaulted interest payments.

Western Maryland.—It is understood that Blair & Co., New York, are to be the managers of the syndicate which is to underwrite the issue of new common stock at 40, as described in the plan published in these columns July 23.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Garden City, Gulf & Northern is having one locomotive built by the Baldwin Locomotive Works.

The Newburgh & South Shore has ordered from the Baldwin Locomotive Works one six-wheel connected switching engine of 105,000 lbs. weight on drivers.

The Missouri Pacific has ordered 30 simple 2-8-0 locomotives from the American Locomotive Co., as mentioned in the *Railroad Age Gazette* of July 9.

General Dimensions.

Weight on drivers	187,200 lbs.
Total weight, including tender	360,000 "
Diameter of cylinders	22 in.
Stroke of pistons	30 "
Diameter of drivers	63 "
Type of boiler	Extended wagon top
Working steam pressure	200 lbs.
Heating surface, tubes	2,744 sq. ft.
" " firebox	177 "
" " total	2,921 "
Tubes, number	340
" outside diameter	2 in.
" length	15 ft. 6 in.
Firebox, type	Wide
" length	108 in.
" width	66 "
Grate area	50 sq. ft.
Tank capacity for water	7,000 gals.
Coal capacity	14 tons

CAR BUILDING.

The Chicago & Oak Park Elevated, Chicago, will buy 20 cars.

The Texas Traction Co., Dallas, Tex., will buy four large interurban cars.

The Wheeling Traction Co., Wheeling, W. Va., has prepared plans for eight 45-ft. cars.

The Texarkana Light & Traction Co., Texarkana, Ark., is reported in the market for six single-truck cars.

The Illinois Traction System, Peoria, Ill., has ordered two sleeping cars from the American Car & Foundry Co.

The Chicago, Burlington & Quincy is said to be in the market for 500 steel gondola cars. This is not yet confirmed.

The Michigan United Railways, Lansing, Mich., has ordered two combination baggage and express cars from the St. Louis Car Co.

The Chattanooga Railways Co., Chattanooga, Tenn., is reported to have ordered 35 motor cars and to be in the market for more rolling stock.

The New York, New Haven & Hartford is said to have ordered passenger cars for a train-de-luxe from the Pullman Company. This item is not confirmed.

The Chesapeake & Ohio ordered the 500 additional hopper cars mentioned in the *Railroad Age Gazette* of June 4 from the Pressed Steel Car Co. and not the Standard Steel Car Co. as was stated.

The New York Central Lines, it is understood, are negotiating with the American Car & Foundry Co. and the Standard Steel Car Co. for the 2,500 box cars, inquiries for which have been previously noted in the *Railroad Age Gazette*.

The Chicago, Burlington & Quincy, reported in the *Railroad Age Gazette* of July 6 as being in the market for 500 refrigerator and 2,000 box cars, is said to have ordered this equipment from the American Car & Foundry Co. This item is not confirmed.

The Buffalo, Rochester & Pittsburgh, as reported in the *Railroad Age Gazette* of July 23, has bought 500 wood steel underframe box cars from the Standard Steel Car Co., 500 wood steel underframe box cars from the American Car & Foundry Co., and 1,000 all-steel hopper cars from the Cambria Steel Co. The box cars have a capacity of 80,000 lbs., length 36 ft., width 8 ft. 6 in., and height 8 ft., inside measurements. The hopper cars will have a capacity of 100,000 lbs., a length of 30 ft., width 9 ft. 5½ in., inside measurements, and length 31 ft. 6 in. over striking plates; width 10 ft., height 10 ft., over all. The special equipment for all cars includes the following:

Axles	(Box) M.C.B. 5-in. x 9 in. journals; (Hopper) 5½ in. x 10 in. journals
Bolsters	Body, steel plate; truck, cast steel
Brakes	Westinghouse
Brake-beams	Davis No. 2
Brake-shoes	Christie Congdon steel back
Brasses	Lawrenceville Bronze Co.
Couplers	5 in. x 7 in. Climax
Doors	(Box) No. 3 security; (Hopper) Hopper
Door fastenings	(Box) National malleable
Draft gear	(Box—Am. Car & Fdy.) Session's friction type "C"; (Box—Standard Steel Car and Hopper) Miner tandem spring "G"
Dust guards	Wood
Journal boxes	Symington
Paint	(Box) Princess' metallic brown; (Hopper) B., R. & P. standard black
Roofs	(Box) Chicago improved Winslow
Side bearings	Plain
Springs	Railway Steel-Springs Co.
Trucks	(Box) Railway Co.'s arch-bar pattern; (Hopper) Andrews cast steel side frames
Wheels	(Box) 33 in. 650 lbs., cast iron; (Hopper) 33 in. 700 lbs. cast iron

IRON AND STEEL.

The Atchison, Topeka & Santa Fe is said to be making inquiries for rails.

The Inland Empire Railroad Co., Spokane, Wash., has ordered 1,800 tons of rails.

The Tulsa Commercial Club, Tulsa, Okla., announces that it is in the market for rails for 1½ miles of electric road.

The San Diego & Arizona Railway recently ordered 1,500 tons of rails and will soon be in the market for more steel.

The New York, New Haven & Hartford is said to have made a contract for re-rolling 15,000 tons of old rails during the year.

The Jones & Laughlin Steel Co., Pittsburgh, Pa., has ordered from the Fort Pitt Bridge Co. 5,000 tons of structural steel for its Aliquippa plant.

The Southern Equipment Co., North Birmingham, Ala., is in the market for four miles of 40-lb., five miles of 60-lb. and two miles of 65-lb. relaying rails, including splices.

The Texas City Transportation Co., Texas City, Tex., has ordered 1,500 tons of structural steel from the American Bridge Co. The material will be used for a warehouse.

The St. Louis Southwestern, reported in the *Railroad Age Gazette* of July 16 as in the market for 2,000 tons of structural steel, has ordered 1,800 tons from the American Bridge Co.

The Cedar Rapids & Iowa City Light & Railway Co., Cedar Rapids, Iowa, has ordered 100 tons of structural steel for a boiler house from the Des Moines Bridge & Iron Co., Des Moines, Iowa.

A Latin-American government railway, according to a consular report, is receiving bids up to August 7 on about 10,000 tons of rails. (Inquiry No. 3646, Bureau of Manufactures, Washington, D. C.).

General Conditions in Steel.—Although there have been no recent advances in the price of steel, except the advance of $2 per ton in wire products, there has been a steadily increasing demand with small prospect of any summer dullness, and the United States Steel Corporation continues to show increased unfilled orders. It is understood that independent steel manufacturers in the East have been large buyers of basic. The action of the directors of the United States Steel Corporation in raising the annual dividend rate from 2 per cent. to 3 per cent. shows a conservative optimism in regard to the outlook in the steel industry that is just about what was expected by those who have been following closely the business of the Steel Corporation. Some of the steel plants of the middle West are running to capacity and the indications are that orders in the present month will be the heaviest since the depression began.

RAILROAD STRUCTURES.

Baltimore, Md.—An officer of the Pennsylvania writes that the station to be put up at Baltimore is not to be a union station and that negotiations are still pending with the city authorities. The only progress that has been made in the direction of definite plans has been in the layout of the tracks. The station structure has not yet been planned.

Buffalo, N. Y.—Work is now under way on a viaduct being built over the Erie tracks at Bailey avenue, from William street, and extending the length of two city blocks. It is expected to have the work finished in one year.

Cochran, Ont.—The Temiskaming & Northern has opened bids for a brick two-story station. The building is to be 35 ft. wide x 150 ft. long, and is to cost approximately $30,000. S. B. Clement is chief engineer of the Temiskaming & Northern Ontario, with office at North Bay, Ont.

Columbus, Ohio.—The Ohio Electric Railway, Cincinnati, Ohio, must build a union station at Third and Rich streets, according to a franchise measure passed by the Columbus city council. The cost is estimated at $175,000.

Duluth, Minn.—Contracts for a depot for the Minneapolis, St. Paul & Sault Ste. Marie are to be let July 31 and active work will start at once.

Empalme, Mex.—The Southern Pacific has completed its new shops at a cost of about $1,500,000. Fifty houses for employees were also built.

Emporia, Kan.—Work has been begun on the new stock yards for the Atchison, Topeka & Santa Fe. Sixty acres of ground has been bought on which to build the new yards, which will contain 54 pens with concrete floors and watering troughs, each pen to have a capacity of two carloads of stock. The cost of the work is reported at $60,000.

Fort Worth, Tex.—See St. Louis Southwestern of Texas under Railroad Construction.

Houston, Tex.—Fire broke out in the yards of the Houston Belt & Terminal Co. July 19, burning a locomotive, 15 box cars, an office and oil supply house, a water tank and a quantity of fuel oil. The loss is estimated at $50,000.

The Houston Belt & Terminal Company, organized to build a passenger terminal and station at Houston, according to reports, will soon ask for bids on the work. (June 11, p. 1232.)

Ladonia, Tex.—The Railroad Commission has approved plans for Atchison, Topeka & Santa Fe depots at Ladonia, Meridian and Pecan Gap.

Louisville, Ky.—The Louisville & Eastern (electric) is asking bids for the erection of two brick sub-stations, three frame stations and 40 shelter houses.

Marcus, Wash.—Work has been started by the Great Northern on a six-stall engine house and machine shop. The company will add later a turntable, cinder pit and other small buildings, including a coal dock.

Minneapolis, Minn.—See Chicago, Milwaukee & St. Paul under Railroad Construction.

New London, Conn.—According to press reports, application has been made by the New York, New Haven & Hartford for permission to build a bridge over the Thames river at New London. The bridge is to be built 100 ft. north of the old structure and will carry four tracks. The estimated cost is $7,000,000.

New York.—The New York Central's plan to cover a portion of the new yard at the Grand Central Station, with office buildings, is to be carried out at once. A tentative contract has been made with the Nicholls-Ritter Realty & Financial Co. of St. Louis to put up two 12-story buildings, each 200 x 275 ft., which, together, will cost $3,500,000. Through the "Merchants & Manufacturers' Exchange" the Realty Company has made arrangements for the occupancy of a considerable part of the space in the new buildings. The buildings will front eastward on Lexington avenue, will extend through to Depew place, and will be bounded north and south by Forty-sixth and Forty-eighth streets, with Forty-seventh street between them. The ground beneath these buildings is already occupied by a portion of the new tracks of the Grand Central terminal. South of Forty-fifth street and also covering these tracks is a building similar in architectural design, which has been put up by the railway company for its own offices. The New York, New Haven & Hartford is a partner with the New York Central in the construction of the new building and also as joint lessee of the new Grand Central Station, although having, it is understood, no title in the land. The Merchants and Manufacturers' Exchange is to take a lease of the buildings for a long term, the spaces occupied by the railway tracks and platforms being all below the level of the street.

The Merchants and Manufacturers' Exchange is to be capitalized at $1,000,000 and its directors will include George C. Smith, of the Westinghouse Companies, and Alexander M. Stewart, of James Stewart & Co.

North Yakima, Wash.—The Northern Pacific is building a depot and express building, as was mentioned in the *Railroad Age Gazette* of June 11. The depot is to be 40 ft. x 164 ft., two stories, of pressed brick, finished inside with terrace floor, glazed tile wall and oak woodwork. The express building is to be 42 ft. x 70 ft. The estimated cost of the two buildings is $50,000.

Pasco, Wash.—The Northern Pacific is building a two-story, wood, recreation building for its employees. The building is 34 ft. x 60 ft., with recreation rooms, library and bath on the first floor and sleeping rooms on the second. The estimated cost is $12,000.

Ridgway, Pa.—An officer of the Buffalo, Rochester & Pittsburgh writes that bids are being asked for building a brick passenger station at Ridgway. The trimmings will be of stone.

Rob Roy, Ark.—The St. Louis Southwestern will build a 440-ft. steel bridge.

Sacramento, Cal.—Contract is said to be let to F. W. Maurice, of Oakland, Cal., for putting up a heavy timber train shed, on concrete foundations, for the Western Pacific along two city blocks on the company's right-of-way.

San Angelo, Tex.—The San Angelo Street Car Co. expects to extend their system, and will be in the market at once for all equipment, including some 20-ft. cars.

Schenectady, N. Y.—According to press reports plans are ready to put up a bridge over the railway tracks at Villa Road. The work is to be carried out by the New York Central & Hudson River and is to be paid for by the city of Schenectady, the New York Central and the Schenectady Railway Co. It is expected that the work will be carried out this fall.

Shepherdstown, W. Va.—The Norfolk & Western will build a story-and-a-half brick passenger station.

Terre Haute, Ind.—An officer of the Vandalia writes that this company is to build a 25-stall engine house, 95 ft. deep, of brick and glass. The work, which has already been started, is being done by the company's forces.

According to press reports the Vandalia has bought land as a site for shops, yards and a roundhouse. The buildings are to cost about $50,000.

Texarkana, Tex.—See St. Louis Southwestern of Texas under Railroad Construction.

Tuscaloosa, Ala.—The Alabama Great Southern will erect a $25,000 depot.

Wellington, Kan.—Work has been begun, according to press reports, on a concrete and brick machine shop for the Atchison, Topeka & Santa Fe. A car repair shop and an addition to the roundhouse may be built later.

Yorksville, S. C.—The Carolina & Northwestern depot was burned.

Supply Trade News.

The Nernst Lamp Co., Pittsburgh, Pa., has been taken from the hands of the receiver. This is the last of the Westinghouse companies that have had their receivers discharged.

A. Munch, manager of the railway department of the North-Western Metal Manufacturing Co., Minneapolis, Minn., has been appointed also a director and the secretary of the company.

The car building plant of the South Baltimore Steel Car & Foundry Co., Baltimore, Md., situated at Curtis Bay, Md., was sold at auction on July 28. The plant has an average capacity of 35 to 40 cars a day.

W. A. Hopkins, formerly electrical engineer of the Wabash at Decatur, Ill., has been appointed electrical engineer Southwestern district of the Safety Car Heating & Lighting Co., New York, with headquarters at St. Louis, Mo.

Eugene Riton has become connected with the O. M. Edwards Co., Syracuse, N. Y. After several weeks' experience in the factory at Syracuse and in the Chicago office he will become resident representative at St. Louis, Mo., from which position Mr. Nicholl recently resigned.

The Pratt & Whitney Co., Hartford, Conn., recently got the contract to build an arms factory in Australia for the government. Its bid is quoted as being about 30 per cent. lower than the nearest English bid; also, they agreed to do the work in one year while the best English bid required three years.

The Atchison, Topeka & Santa Fe has recently placed an order covering 116 axle lighting equipments for their cars. The order includes 1,856 storage battery cells manufactured by the Electric Storage Battery Co., Philadelphia, Pa. The Santa Fe uses the "chloride accumulator" exclusively on their car lighting equipments.

At the July directors' meeting of the Crocker-Wheeler Co., Ampere, N. J., while Dr. Schuyler Skaats Wheeler continues in office as president, the following officers were elected for the ensuing year: President, Dr. S. S. Wheeler; vice-president, Gano Dunn; second vice-president, A. L. Doremus; chief engineer, Gano Dunn; secretary, Rodman Gilder; treasurer, W. L. Brownell; assistant treasurer, G. W. Bower.

Stockholders of the International Steam Pump Co., New York, have voted to authorize an issue of $12,000,000 20-year 5 per cent. bonds, and about $8,000,000 of these bonds have been sold to William Salomon & Co., New York, the proceeds to be used to retire the outstanding $3,500,000 6 per cent. debentures and to pay floating indebtedness amounting to about $1,500,000 and for construction of additions and betterments.

The government has begun the shipment of 1,000,000 tons of cement for the Panama canal. The steamship Ancon, of the Panama Railroad's steamship line, sailed last week from New York for Panama carrying about 8,600 tons. This vessel and the Cristobal will carry 9,500 tons each voyage as soon as these quantities are available. At this rate the transportation of the 960,000 tons so far contracted for will take about four years.

For additional power on its lines and for lighting several adjoining towns, including Narragansett Pier, R. I., and Wickford, the Sea View Railroad has installed in its Hamilton, R. I., power station two 400 kilowatt Westinghouse turbines driving Westinghouse three-phase, 60-cycle, 360-volt alternators. This equipment is additional to a set of horizontal, cross-compound, reciprocating engines driving Westinghouse generators, already installed. The plant is supplied with Westinghouse LeBlanc condensers which preserve a vacuum of 28 in.

The American Society of Engineering Contractors have accepted an invitation from the Cement Products Exhibition Co. to hold their next annual convention in Chicago during the third annual cement show, Feb. 18-26. The days upon which their meetings will be held are Feb. 24, 25 and 26. George W. Jackson, the well-known Chicago contractor, is president of the society, which has some 1,500 members. The convention of this organization in Chicago during the cement show will attach additional interest to this important exhibition.

The directors of the United States Steel Corporation have declared a quarterly dividend of ¾ per cent. on the common stock, thus placing this stock on a 3 per cent. annual basis. One per cent. was paid quarterly from September, 1901, to September, 1903, inclusive. The December, 1903, dividend was ½ per cent., and after that no dividends were paid on the common stock until 1906, when 1 per cent. was paid in October from earnings of the previous half year, and since then quarterly dividends of ½ per cent. have been paid. The last annual report shows $508,302,500 common stock outstanding and $360,281,100 preferred stock. The preferred stock is 7 per cent. cumulative and dividends of 7 per cent. have been paid since the organization of the Steel Corporation.

The new building in process of erection by the Frog, Switch & Manufacturing Co., Carlisle, Pa., to replace the building recently destroyed by fire, will be of steel and concrete, having an extreme length of 460 ft. and an extreme width of 165 ft., with two electric traveling cranes running the entire length of the shop, and a third one in the loading department. All of the machinery will be run by electric power on the individual machine plan. The equipment will give the company a capacity of from 20,000 to 25,000 frogs and switches per year, with a similar increase in the production of other articles. The McClintic-Marshall Construction Co., Pottstown, Pa., is to furnish the steel work. It is expected that the new building will be equipped and in full operation by September 1

TRADE PUBLICATIONS.

Ventilating Fans.—The American Blower Co., Detroit, Mich., has published a small illustrated folder calling attention to various uses for its ventilating apparatus.

Furnaces.—The Rockwell Furnace Co., New York, has published a pamphlet, 16 in. x 11 in., containing 12 pages of half-tone views of the company's works and of the various furnaces it makes.

Hydraulic Beam Shears and Coping Machine.—The Watson-Stillman Co., New York, have just published catalogue No. 74 describing the new Watson-Stillman coping machine and beam shear. The description is amplified by photographs, drawings and tables of dimensions.

Regulators.—The Mason Regulator Co., Boston, Mass., has published General Catalogue No. 58 of its regulating appliances. It consists of 178 pages, well illustrated, and describing, with full dimensions and price list, reducing valves, automatic regulating devices for pumps, draft regulators for controlling boiler pressures, balanced valves, Mason steam pump, etc.

Locomotive Lubricators.—A small pamphlet is being distributed by the Detroit Lubricator Co., Detroit, Mich., describing the "Detroit" bull's-eye lubricator. The illustrated booklet contains a full description of the various types and sizes of lubricators, together with valuable information relative to installation, operation, care, etc. There is also included a price list of parts.

Control System.—Bulletin No. 4,677, just issued by the General Electric Co., Schenectady, N. Y., contains data relative to the Sprague-General Electric Type M system of control, and forms a revision of similar data contained in a previous bulletin on this subject. The publication contains numerous illustrations showing the various pieces of apparatus used in connection with this system, with a description of each.

My Trip to Detroit.—This is the title of a little guide being distributed to visitors at the factory of the Burroughs Adding Machine Co., Detroit, Mich. The guide is vest pocket size and is sent with invitations to inspect the plant of the Burroughs Adding Machine Co. The first half of the little booklet is arranged for notes, every other page being blank, and on the facing page there are small but excellent photographs

of Detroit and the surrounding country. The remainder of the booklet is illustrated with views of the plant of the company and with photographs of its products.

Four-Cylinder Balanced Compound Locomotives. — Hannoversche Maschinenbau-Actien-Gesellschaft, Hannover-Linden, Germany, have published a pamphlet in four languages—German, English, French and Spanish—describing several four-cylinder balanced compound engines on the von Borries de Glehn and Vauclain systems. Dimensions of each engine are given, as well as the biography telling in what periodicals they have been described.

Western Electric Co.—Among recent folders issued by the Western Electric Co., Chicago, are leaflets on the Hawthorne Resin Core solder put up in the form of seamless tubes, Hawthorne magneto test set, and Hawthorne motors, arc lamps and exhaust fans.

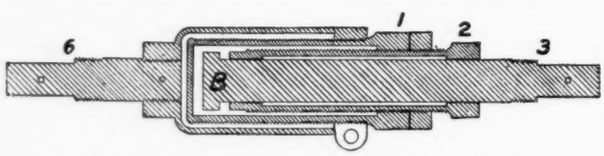
The company has published in the form of a pamphlet the story of the rush order it filled in supplying a switchboard last fall when a fire had crippled the telephone system of Paris.

Single-Phase Motors.—Bulletin No. 4,675, recently issued by the General Electric Co., Schenectady, N. Y., describes and illustrates a new single-phase induction motor of the repulsion induction type, designated as Type "RI," and developed by the General Electric Co. for use in connection with installations where the starting torque of the resistance reactance type of induction motor will not meet the demand of the driven machine, or where within certain limits variable speed is required.

Electric Crossing Bell Appliances and Universal Relays.—The Union Switch & Signal Co., Swissvale, Pa., has published a catalogue and price list, superseding bulletin 24, concerning direct and alternating-current highway crossing bell apparatus. The pamphlet is fully illustrated and contains, as well as descriptions of devices, information required for making proposals for installations, suggestions with regard to installations, suggestions for the guidance of inspectors and maintainers, and diagrams and descriptions of single and double-track crossing bell layouts. Bulletin No. 41 is devoted to universal relays of the 9 C type. Several views of each of a number of designs are given, with brief descriptions.

Lutz Combination Adjuster.

The Lutz combination adjuster, designed to take up lost motion in switch connections, is now in use on a dozen different railways, and is reported to be giving satisfactory service. It takes the place of a turnbuckle, and besides can be quickly adjusted to provide for lost motion. Its construction is shown in the sectional drawing. Arm 6 is the connection to the operating lever and 3 is the connection to the switch. The adjusting plug 1 is screwed into the barrel or main casting. To provide for lost motion—that is, where the stroke of the lever is in effect greater than that of the switch, the adjuster



Longitudinal Cross Section of Lutz Adjuster.

is inserted in the pipe line near the switch, and the head of bolt 3, indicated by B, is given play between the end of adjusting plug 2 and the inner end of adjusting plug 1. When the adjuster is put in, bolt 3 is pushed in against the inner end of 1; and while in this position the switch rod is bolted to the end of bolt 3. To adjust for thrust, plug 1 is unscrewed, which will lengthen the connection; that is, will push rod 6 to the left. To adjust on the other side, the operating lever is reversed and adjusting plug 2 is screwed in, which draws bolt 3 and pulls the switch rail close up to the stock rail.

When the adjuster is used simply as a turnbuckle, plug 1 is unscrewed half way and plug 2 is then screwed all the way in, though not so far as to cause the bolt head B to bind against plug 1. This done, there is no space for play of the bolt head, and the line may be shortened or lengthened by turning plug 1.

The proprietor of this adjuster tells us that it has been in use for over two years at a switch in a yard where it has to be moved a hundred times a day, and that the wear and tear during this time has been inappreciable; and no repairs have been required. The adjuster can be put into a pipe line at any point. Using this to provide for loose or worn connections, it is not necessary to drill holes for new crank connections or to make precise adjustments with any of the connections. The alternative of either drilling new holes or throwing away parts which are not worn out does not present itself, as is often the case in ordinary practice with connections which receive hard usage. The repairman's time is saved, owing to the ease and simplicity of the task of putting in one of the adjusters. The essential parts of the device are enclosed, and therefore free from disturbance by snow or ice.

This adjuster is made by T. E. Lutz & Brother, Galion, Ohio.

The Buda Hand Car.

On Sunday, July 25, Louis Bleriot crossed the English Channel on his aeroplane, making the flight from Calais to Dover in 23 minutes. Previous to this historic event, the Buda Foundry & Manufacturing

A New Kind of Airship.

Co., Chicago, Ill., made a photograph showing one of its light-running hand cars in the Chicago air, well above the buildings with tall stories for which that city is noted. The photograph is used to decorate a calendar which the company issues in order to intimate to its customers that the nearly frictionless helical-cut gears and bearings enable its cars to move with ease.

Duntley Manufacturing Company.

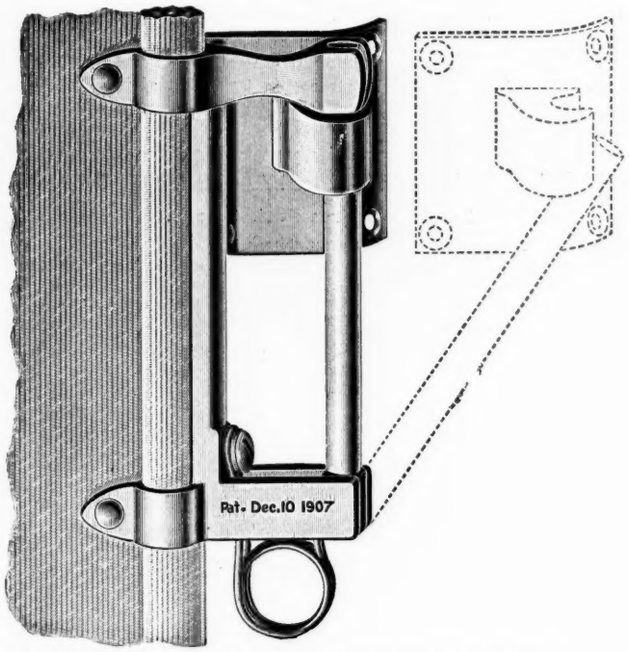
The Duntley Manufacturing Co., Chicago, has moved from the entire fourth floor of the Plymouth building to the entire fourth floor of the Harvester building, 234 Michigan boulevard, containing some 5,000 sq. ft. of office space. In addition to this, the company has leased a store on the ground floor of the Harvester building, fronting on Michigan boulevard, containing some 1,250 sq. ft. The store has been handsomely furnished and is used as an exhibition room and sales department for the Duntley pneumatic cleaners for railway and household purposes. The fourth floor has been divided into some seven or eight private offices and large open offices for the sales, purchase and accounting departments. John W. Duntley, president of the company, occupies a spacious office on the northeast corner of the floor, overlooking Grant park. Adjoining his office is that of B. E. Harris, sales manager of the pneumatic cleaner department. On the Harrison street side are the offices of Charles E. Walker, manager of the railway department; Eugene McComas, treasurer, and the accounting department in charge of F. A. Rautenberg, secretary. On the west side of the floor is the mechanical engineering department, in

charge of J. W. Smith. The purchasing department, in charge of G. C. Armstrong, ocupies the southeast corner of the floor overlooking Grant park. F. T. Short is in charge of the publicity.

The output of the company consists of the Duntley No. 1 standard pneumatic cleaner for household work, No. 2 for apartments and small houses, No. 3 for still lighter work, No. 5 a portable gasolene-driven cleaner for passenger coach, shop and depot work; the Duntley disinfector, used in connection with the cleaners for disinfecting cars, houses and offices; and the Rockford gasolene motor cars for railway service. The cleaners are being sold at the rate of 50 to 80 a day, and by September 1 the manufacturing capacity will be 100 a day. The number of sales and orders for the Rockford motor cars has already passed the 800 mark. Users of these cars are quoted as expressing complete satisfaction. One of the largest northwestern systems says that on one division sections have been lengthened from four miles of double track to six miles, and that 22 foremen are used, as against 33 with the old hand cars. The saving in labor has amounted to $1,365 a month, figuring the number of sections taken out and a saving of one hour a day per man going to and from work. The cost of gasolene and valve oil averaged 1 cent per mile. The cars have been in operation for 60 days without requiring repairs, and their efficiency was pronounced. And the railway writes that the first 25 cars received, although manned by green men, reduced track expenses one-third and affected the service favorably. A northern railway, using a No. 4 car, reported complete satisfaction on a branch line 24 miles long. There was no trouble in taking care of the work in better shape with one crew than with the three crews previously employed, in addition to saving the company about $110 a month. A signal maintainer in the West reported a succession of severe tests for his Rockford car on some of the worst grades on the sytem around sharp curves and against Wyoming's famous winds, with most favorable results.

Automatic Releasable Vestibule Curtain Handle.

The automatic releasable vestibule curtain handle shown herewith is designed to prevent the damaging, tearing and losing of vestibule curtains due to brakemen or yardmen failing to unhook them before uncoupling the cars. The illustration shows the handle bar in the normal or closed position, with dotted lines to show the handle in the



Automatic Releasable Vestibule Curtain Handle.

open position as the vestibule hook is being released. The handle bar is pivoted at its lower end, and is held in position by the coil spring. When the cars part and the curtain is unrolled to its full length without being unhooked, the upper end of the bar swings out under the increased tension and allows the hook to escape.

The device is claimed to be automatic and positive in action, and can be readily applied to any vestibule curtain now in use in connection with any hook. The handle is strongly made and will last a long time, the handle bar being of steel, plated to prevent rusting. The use of a brass-plated steel hook in connection with the releasable handle is designed to increase the life of the entire device. The maker of the device, the Curtain Supply Co., Chicago, reports that it has put it on the market only after a most thorough test under the hardest conditions of actual service for a considerable length of time.

Measuring Tape.

The accompanying cut shows the Samson linen measuring tape made by the Keuffel & Esser Co., Hoboken, N. J. It is made in extra heavy pure linen and is made especially to withstand severe usage in railway construction, lumbering, dock building, mining, etc. It is closely woven and has a coating to protect it from dampness. The

makers claim that it will prove highly efficient where steel tapes and ordinary linen lines do not give satisfaction. This tape is 5/8 in. wide, the end of the line being reinforced with leather. Graduations begin at the outside end of the ring. The case is of stout bent leather, with patent center and long folding handle. All mountings are nickel plated. The tape is furnished in both 50 and 100-ft. lengths, graduated in either inches or tenths of feet.

Watson-Stillman Hydraulic Jacks.

The new shop jack made by the Watson-Stillman Co., New York, shown in the first illustration, renders easy much of the labor of moving jacks around the shop. This jack, made in 11 sizes from 20 to 50 tons capacity, and lifts of 12 and 18 inches, fills all the ordinary requirements of lifting heavy machinery and for general shop work. The wheels on the base and the handle on the cylinder facilitate moving the jack quickly from one place to another without the exertion of a great deal of energy. The wheels touch the floor only when the jack is tilted, so they are never in the way during the lifting operation. If it is desired to use the jack at an angle, it can be tilted in the opposite direction to the wheels, and when it is laid flat upon the side, the ram will push out its entire lifting length. The head is enlarged sufficiently so that the jack will not stop working for lack of filling, even if there has been slight leakage. An independent steel claw (not shown in the illustration) can be used when desired for lifting from near the ground. This is more convenient than a permanently attached claw, as the independent part

Fig. 1.

Fig. 2.

is easily applied when a low lift is required, and its removal at other times allows the jack to be made of considerably lighter weight. The weight, however, is comparatively small, because the whole jack is made of steel, and the parts under greatest strain, such as the ram and cylinder, are machined from a solid bar of higher carbon steel than is usually found in hydraulic or other jacks.

It is sometimes inconvenient to work the lever of a jack of the internal-pump type because of lack of room or insufficient footing. There are other places where only a short space is available to place the jack—another condition which cannot be met successfully with the ordinary inside-pump jack. This is especially true in bridge work. Even in more common work it is sometimes to the operator's advantage in the way of getting a better footing, more power or safety, to be at a considerable distance away from the jack. To meet these

conditions the independent-pump hydraulic jack shown in the second illustration is furnished in 53 sizes of from 2 to 1,200 tons capacity. The various sizes of the jack proper have maximum ram movements of from 4 to 8 inches. The pump is connected to the jack by flexible copper tubing, which may be of any length suitable to the work in question. The jack may be operated up to a pressure of 450 lbs. per square inch on the ram by means of the hand lever shown on the pump, and further worked to full capacity by means of the extension lever. The gage may read in pounds per square inch or in tons load upon the jack, or both. This gage is not furnished when the jack is to be used for ordinary lifting, but is necessary in testing. When equipped with the gage, the jack may be used between two fixed platens for making compression tests, or testing the tightness of force fits, etc.

Both of the above jacks can stand a considerable overload without danger of inujry to the operator or jack.

A New Curtain Fixture.

The Eclipse curtain fixture, an improved type just being put on the market, is shown in the accompanying illustrations. Simplicity and durability are primary advantages for the device. It consists of a brass tube, one small spring, an operating lever made of brass, two brass guide heads, two round steel rods to which small steel clips

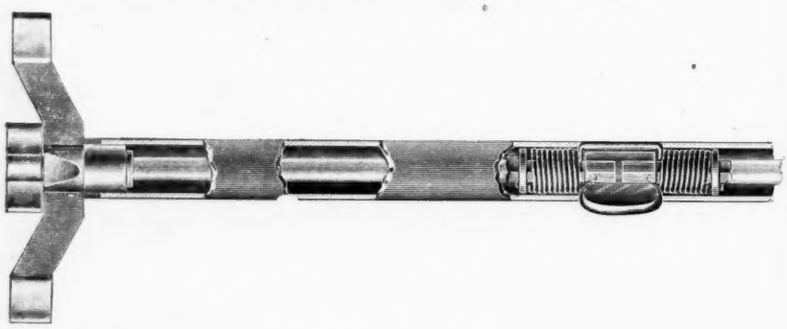


Fig. 1—Sectional View of Eclipse Fixture.

are fastened and a brass covered plate, part of which forms the pinch handle. It is easily kept clean, there being no pockets to permit the accumulation of dust and dirt.

Fig. 1 is a sectional view of the fixture with cover plate or handle removed, showing the position of the operating lever, the spring and the round rods when assembled. Running through the inside of the lever is a square hole. The spring has two small washers riveted to it, with square holes in them. One end of each rod is squared, as shown in the illustration; these rods pass through the washers, through the torsion spring and into the square hole in the operating lever, the ends of the rods almost meeting in the center of the lever. The square hole in the lever being a trifle larger than the square ends of the rods gives each rod enough independent action to insure gripping in both grooves should they vary any in width. The tube is slotted in both ends and the guide heads are fastened to the rods so that they can be pushed in or drawn out ¾ in. for adjustment, should the distance between the top and bottom of the grooves vary. The assembling of the fixture is simple and the curtains can be attached very easily.

Fig. 2 shows the end of the fixture in holding position. The principle of locking is simple and effective, the grip or friction being on the sides of the grooves instead of an outward pressure against the posts. On each end of the fixture there is a small S-shaped casting, which, with the guide heads, forms an X, giving four points of con-

Fig. 2—End View of Eclipse Fixture.

tact in each groove, and locking the fixture so securely that it cannot creep. It is immaterial whether the grooves be rough or smooth, varnished or unvarnished. The fixture requires the same sized grooves as all others, viz., ⅝-in. wide by ⅜-in. to ½-in. deep. The clips and guide heads are shaped so that they will not wear, scratch or cut the grooves. This locking arrangement will work well in steel cars where brass slots or grooves are used and fastened on with screws driven through the bottom of the groove into the post, as there is nothing to rattle and the end of the fixture cannot catch on the screw slots, there being ⅛-in. clearance.

Fig. 3 shows the position of the pinch handle. It is opposite to usual practice, and it is thought will be more convenient for passengers to operate, the movement being with the action of the curtain, that is, up or down. In other words, it is not necessary to pinch horizontally and then push up or pull down. All one has to do to release the tension is to take hold of the pinch handle, give it the slightest pressure, and it is free to run up or down.

When attached to a curtain, only a slight portion of the guide heads can be seen when placed in the window frame. As the heads do not move in or out in the operation, the curtains can be made wide enough to shut out the light entirely. This feature, together with the fact that the curtain cannot creep, is very desirable for sleeping cars to keep out all light in the early morning.

Even with the best of materials and workmanship, the few parts and small amount of work make the fixture comparatively cheap. Because the parts are made of solid metal the device should be very durable, as it is made to withstand rough usage. The spring is made of music wire and will wear indefinitely.

The tension being controlled by one lever and one spring insures the releasing of both sides at the same instant, allowing the curtains to roll and unroll evenly at all times. This feature eliminates crooked or furrowed curtains. The curtain can be drawn down by placing one finger on the top or operating lever and drawing the hand or arm

Fig. 3—Pinch Handle, Eclipse Fixture.

downward, or let up by the slightest pressure of the pinch handle.

The ends of the fixture clear the post by ⅛-in., allowing the curtain to be up-ended and taken out of the grooves for cleaning. This feature also makes it impossible for the fixture to bind or wedge between the posts. The Eclipse fixture is made and sold by the Planet Co., Chicago.

Carr's Overtime Pocket Book.

The illustration given herewith is of part of a page of a little pocket book designed for recording overtime. The columns may be used to book either the number of hours overtime, or the amounts in dollars and cents. The figures shown represent hours overtime, with increases each day from beginning of the month to date. The

Overtime for Sept 1907 E&W Dist. Div.

Date	TRAINMEN					ENGINEMEN				
	Today	To Date	Last Year	Inc.	Dec.	Today	To Date	Last Year	Inc.	Dec.
1	10	10	8	2		9	9	6	3	
2	7	17	13	4		7	16	9	7	
3	8	25	23	2		6	22	18	4	
4	9	34	29	6		8	30	26	4	
5	10	44	35	9		7	37	31	6	
6	5	49	42	7		4	41	38	3	
7	4	53	52	1		3	44	45		1
8	3	56	57		1	4	48	49		1
9	2	58	60		2	3	51	55		4
10										
11										
12										
13										
14										

book consists of 60 pages, and thus is good for five districts one year or one district five years. At the bottom of the page there are spaces for total freight wages, per cent., overtime and freight engine miles. The book is made by O. O. Carr, Carbondale, Ill. Mr. Carr is connected with the superintendent's office of the Illinois Central. The book is bound in leather and the price is $1.